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ABSTRACT

This series of learning activity packages is based on a catalog of performance objectives, criterion-referenced measures, and performance guides for gardening/groundskeeping developed by the Vocational Education Consortium of States (V-TECS). Learning Activity packages are presented in three areas: (1) preparing or improving soil, (2) operating equipment, and (3) maintaining equipment. Each of the forty-one learning activity packages follows a typical format: introduction: directions to the students: objective(s); learning activities; safety; equipment, tools, supplies needed; instructions; student self-check: final check-out activity: and instructor's final checklist. (LRA)

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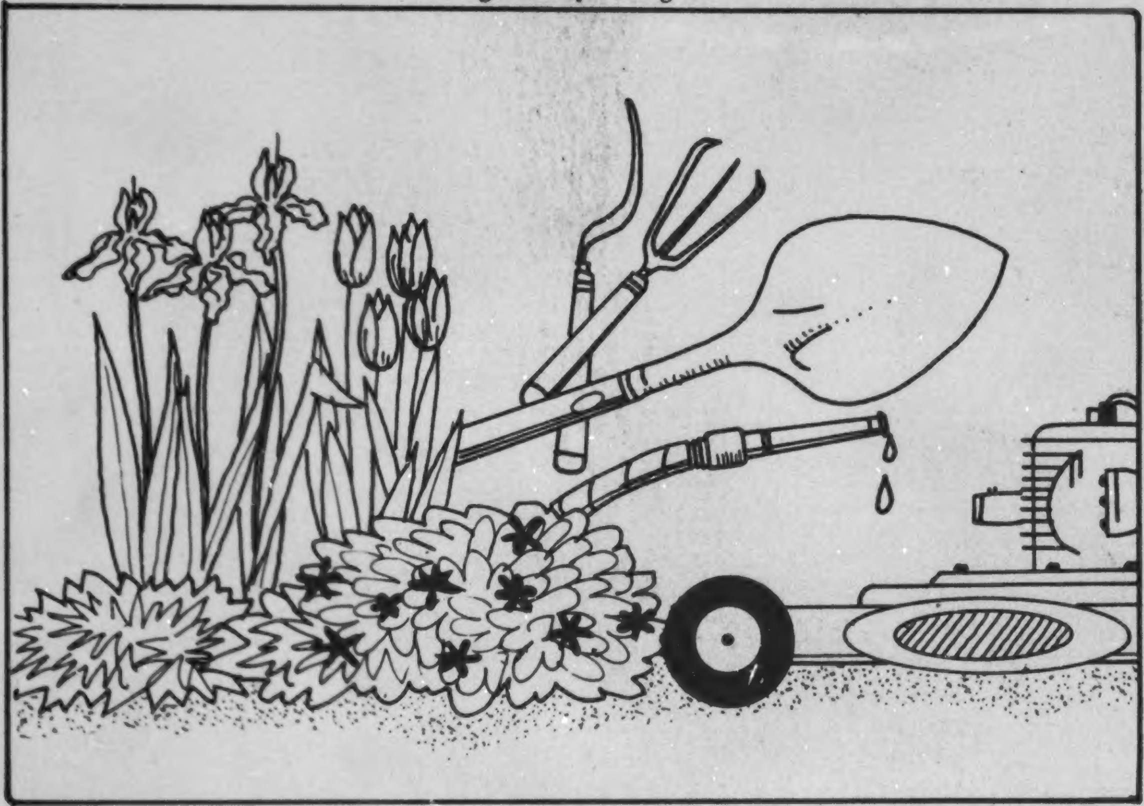
GARDENING AND GROUNDSKEEPING

A Series of
Learning Activity Packages

Volume II
Learning Activity Packages 43-84



State Department of Education
Office of Vocational Education
Agricultural Education Section
Columbia, South Carolina 29201

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Clemson, South Carolina 29631

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INTRODUCTORY STATEMENT

These learning activity packages are based on a catalog of performance objectives, criterion-referenced measures and performance guides for gardening-groundskeeping developed by the Vocational Education Consortium of States (V-TECS). The learning activity packages follow a typical format:

Introduction
Directions to the Student
Objective(s)
Learning Activities
Safety
Equipment, Tools, Supplies Needed
Instructions
Student Self-Check
Final Check-Out Activity
Instructor's Final Checklist

In most cases they are not content complete, i.e., they do not contain all of the information or instructions necessary to complete the task. They do, however, refer the student (very specifically) to such content. The references listed are therefore essential. Alternative references are usually listed and finally a blank line is left for the instructor to place an additional alternative reference available to the student. A listing of all publications referred to in these packages is listed on the last page.

This publication will be printed in two volumes to provide greater flexibility in use. Master copies of the Student Self-Checks and Instructor Final Checklists will be printed and provided to the instructor for recording student responses. Students should be reminded that they are not to write on any part of the learning activity packages.

ACKNOWLEDGEMENTS

Grateful appreciation is extended to the following persons who contributed to the development of these learning activity packages:

The writers were:

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The final copy was edited by Dr. R.J. Mercer, Vocational Instructional Materials Specialist, Vocational Education Media Center, Clemson, South Carolina.

FEB 1 3 1980

GARDENING AND GROUNDSKEEPING

Volume II

Learning Activity Packages 43-84

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Learning Activity Package No. 43

Gardening-
Groundskeeping

PEAT
Preparing &
Improving Soils

PREPARING A COMPOST

Objective No. 80

Ornamental Horticulture

INTRODUCTION

Gardening and groundskeeping requires the use of decomposed materials, such as a compost, to improve the soil you are working with. Compost is a valuable source of humus or organic matter. Materials that are needed for compost are often available free if one knows what to look for. Grass clippings, garden weeds, hay, tree leaves, sawdust, bark, and vegetable materials are some of the items that may be used. In this learning package, you will learn how to prepare a compost.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given a compost bin, tools and organic materials, prepare a compost. Alternate layers of organic materials should exist, with the surface of the top layer flat or slightly concave.

LEARNING ACTIVITIES

1 READ one of the following:

Ornamental Horticulture, 1979, pp. 413-4.

or

New Illustrated Encyclopedia of Gardening, p. 465-467.

or ______________________

2 CHECK YOUR KNOWLEDGE of preparing a compost by taking the Student Self-Check.

3 OBSERVE another student (or group of students) as he or she (or they) satisfactorily performs and is (are) checked out on this learning activity package.

4 PRACTICE performing the task of preparing a compost.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

No special safety precautions needed.

EQUIPMENT NEEDED

1. Pitchfork
2. Water hose
3. Compost bin
4. Ruler

MATERIALS NEEDED

1. Two types of organic materials to be used in compost heap
2. Decomposition chemicals and fertilizer
3. Lime

INSTRUCTIONS

(1) Add 6" (15 cm) of organic material to bin.

(2) Add 2" (5 cm) of top soil.

(3) Add lime and a complete fertilizer.

(4) Wet materials.

(5) Repeat steps 1-4 until desired compost depth is reached (generally 3-5 feet).

(6) Mix the materials frequently.

(7) Cap the compost pile with a layer of soil.

(8) Leave a slight depression in the center of the pile to collect water.

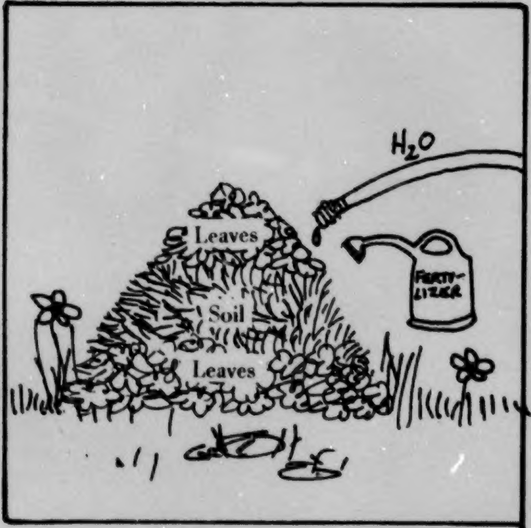


Figure 1. Compost is frequently made by storing layers of leaves and soil. A small amount of fertilizer and water is added to aid decomposition.

STUDENT SELF-CHECK
DO NOT WRITE ON THIS SHEET
PREPARING A COMPOST

Check True or False.

1. Compost is primarily composed of organic matter.

   True ___ False ___

2. Compost is used to improve soils.

   True ___ False ___

3. No fertilizer or lime is needed in a compost pile.

   True ___ False ___

4. Compost is a substitute for animal manures.

   True ___ False ___

5. Compost heaps are made out of expensive materials.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist. PREPARING COMPOST.

In a designated area, prepare a compost.

CORRECT RESPONSES

1. True 2. True 3. False 4. True 5. False

LAP 43

Student ____________________

Date ____________________

DO NOT WRITE ON THIS SHEET

PREPARING A COMPOST

Instructor's Final Checklist

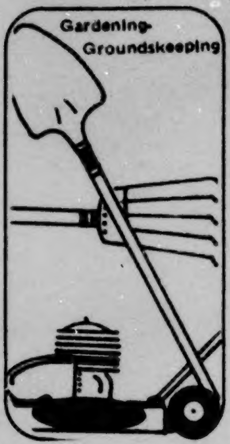
Check the student's performance in the following elements of preparing a compost.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Alternated layers of different organic materials every 12" (30.48 cm).	[ ]	[ ]	[ ]	[ ]
2. Added decomposition chemicals evenly between layers of organic materials.	[ ]	[ ]	[ ]	[ ]
3. Wet thoroughly and packed down each layer of organic materials properly.	[ ]	[ ]	[ ]	[ ]
4. Covered top of heap with topsoil leaving a slight depression.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 44



PEAT
Preparing &
Improving Soils

APPLYING COMPOST

Objective No. 81

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping, the addition of compost to the soil is often necessary. Compost is a good substitute for well-potted manure. The addition of compost in the soil adds organic matter as well as nutrients essential for plant growth.

When applying compost you need to distribute the material evenly over the intended area. The compost must be tilled thoroughly into the soil. In this learning activity package, you will learn how to apply compost.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given compost and the necessary tools, spread and till the compost into a soil area. Coverage should be uniform and thorough mixing should be evident.

LEARNING ACTIVITIES

1 READ *Ornamental Horticulture,* pp. 463-64.

or ______________________________

2 READ the Instructions.

3 READ – RELATED INFORMATION.

4 CHECK YOUR KNOWLEDGE of applying compost by taking Student Self-Check.

5 OBSERVE another student (or group of students) as he or she (or they) satisfactorily performs and is checked out on this learning activity package.

6 PRACTICE performing the task of applying compost.

7 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Follow safety procedures for use of tiller.

EQUIPMENT NEEDED

1. Shovel or pitchfork
2. Rake
3. Wheelbarrow
4. Tiller

MATERIALS NEEDED

Compost

INSTRUCTIONS

(1) Spread ½" (1.27 cm) of compost uniformly over soil area.

(2 Till compost into soil.

(3) Spread remaining compost over soil area uniformly.

(4) Till soil and compost thoroughly.

(5) Rake and level.

RELATED INFORMATION

Compost is a mixture of decayed plant or animal matter and soil. Usually it is made of decomposing leaves and soil. Lime, fertilizer and water are generally added to aid decomposition. Usually leaves are made into six inch (15 cm) bed 8 to 10 sq. ft. (.7 to .9 sq. m) in area. Then 2 inches (5 cm) of soil and a small quantity of fertilizer (about 1 quart) (.9 l) is added. This is done in the fall. The compost will usually be sufficiently decomposed by spring.

Compost is sometimes used as a substitute for inorganic fertilizer. It is usually not as high in nutrient value and is slower in becoming available to plants. Due to its granular texture it makes an excellent soil conditioner.

STUDENT SELF-CHECK
DO NOT WRITE ON THIS SHEET
APPLYING COMPOST

Check True or False.

1. Compost is a good soil conditioner.

   True ___ False ___

2. Compost should be mixed thoroughly with soil.

   True ___ False ___

3. Compost adds nutrients to the soil.

   True ___ False ___

4. Compost should be distributed unevenly to the soil.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, APPLYING COMPOST.

Use compost in a given soil area.

CORRECT RESPONSES

1. True 2. True 3. True 4. False

DO NOT WRITE ON THIS SHEET

LAP 44

Student ____________________

Date ____________________

APPLYING COMPOST

Instructor's Final Checklist

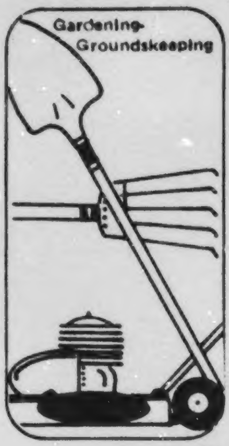
Check the student's performance in the following elements of applying compost.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Applied ½" (1.27 cm) of compost uniformly.	☐	☐	☐	☐
2. Tilled compost into soil.	☐	☐	☐	☐
3. Spread remaining compost over soil.	☐	☐	☐	☐
4. Tilled compost thoroughly after all compost was applied.	☐	☐	☐	☐
5. Raked area level.	☐	☐	☐	☐
6. Cleaned and stored all tools and materials.	☐	☐	☐	☐

Learning Activity Package No. 45



PEAT
Preparing &
Improving Soils

HAULING AND SPREADING TOPSOIL

Objective No. 79

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping, it is often necessary to add topsoil to places that are void or have little topsoil. When adding topsoil, you must be careful to add the soil evenly to the entire area. This requires that you set grade stakes on the original grade. Also, you must be careful to bond the topsoil with the subsoil. In this learning activity package, you will learn how to haul and spread topsoil.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given an area void to topsoil and the necessary tools and equipment, haul and spread topsoil on the designated area to a depth of 10" to 12". (25.4 to 30.5 cm)

LEARNING ACTIVITIES

1 Instructor will provide information sheet.

2 CHECK YOUR KNOWLEDGE of hauling and spreading topsoil by taking the Student Self-Check.

3 OBSERVE another student (or group of students) as he or she (or they) satisfactorily perform and is (or are) checked out on this learning activity package.

4 PRACTICE performing the task of hauling and spreading topsoil.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

No special precautions necessary.

EQUIPMENT NEEDED

1. Wheelbarrow or trailer
2. Shovel
3. Rake
4. Hammer
5. Ruler

MATERIALS NEEDED

1. Fill stakes
2. Topsoil
3. Lawn roller

INSTRUCTIONS

(1) Locate grade stakes and mark for final grade.

(2) Loosen existing ground with rake or tiller.

(3) Choose path for bringing soil to exact location.

(4) Load wheelbarrow.

(5) Transport and deposit topsoil on area.

(6) Continue Step number (5) until all soil is moved.

(7) Spread topsoil to desired depth.

(8) Level topsoil with rake.

(9) Firm soil to make sure height is correct after settling.

(10) Rake level.

(11) Remove grade stakes.

On large areas power equipment may be necessary.

RELATED INFORMATION

Topsoil can be applied in a number of ways dependent mainly upon the scope of operation. If topsoil is to be applied over several acres, large dump trucks with "spinners" similar to those used for spreading lime may be desired. For small areas a wheelbarrow, shovel and rake may be sufficient.

The major problem may be the preparation of the soil area to be covered. First the soil should be loosened in some matter to prevent an area of compaction between the existing soil and the topsoil to be added. Again, if several acres are to be treated, large equipment such as a disk harrow might be used to loosen the existing sod or soil. If a small area is to be treated a tiller or shovel might be used to perform this task.

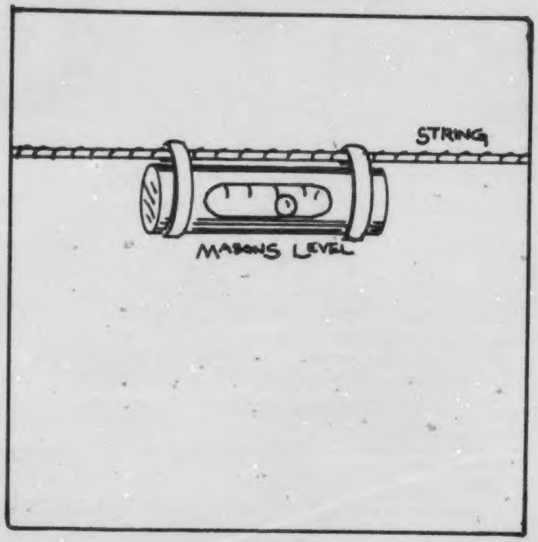


Figure 1. A mason's line level can be snapped on to a string for leveling.

The next problem which the beginner will likely face is the grading of the area to be treated. If the existing grade is to be maintained and only a small area is being treated then grade stakes may not be needed. In most cases, however, it will be best to install grade stakes to the height of the desired thickness of topsoil to be added.

If the present grade is not to be maintained, it will be necessary to set grade stakes using a leveling device. Perhaps the simplist of these is the line level used by brick masonry (see figures 1 and 2). Another possibility is to use a plastic tube or hose (see figure 3).

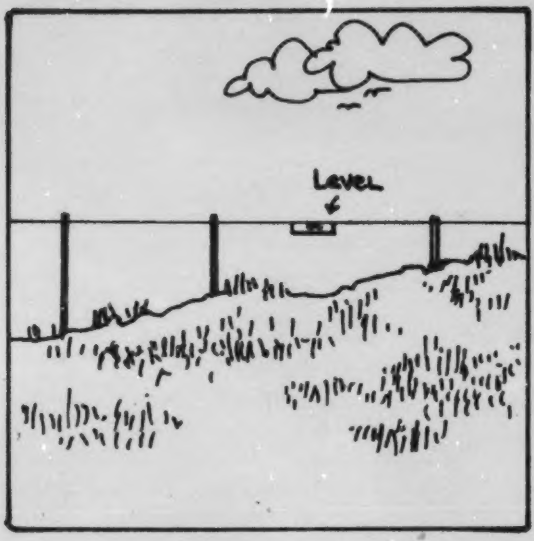


Figure 2. String with level can be moved from one central stake to other stakes to establish grade.

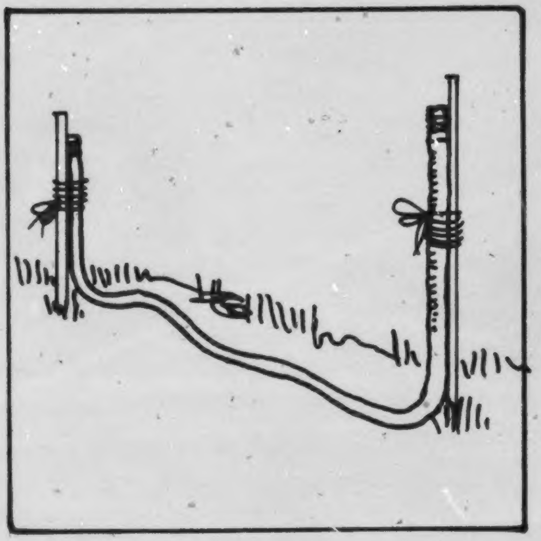


Figure 3. A garden hose or plastic tubing filled with water can be used to determine grade.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

HAULING AND SPREADING TOPSOIL

Check True or False.

1. When spreading topsoil it is necessary to spread the soil at the same depth over the entire area.

   True ___ False ___

2. If topsoil is not firmed or packed carefully, erosion will occur and wash away some or all of the topsoil.

   True ___ False ___

3. The topsoil should bond to the subsoil.

   True ___ False ___

4. One to two inches of topsoil is enough to support most plant life. (2.5 to 5 cm)

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statements below explain the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, HAULING AND SPREADING TOPSOIL.

An area has been designated by your instructor for topsoil coverage. Haul and spread topsoil over the site.

CORRECT RESPONSES

1. True 2. True 3. True 4. False

DO NOT WRITE ON THIS SHEET

LAP 45

Student ______________________

Date ______________________

HAULING AND SPREADING TOPSOIL

Instructor's Final Checklist

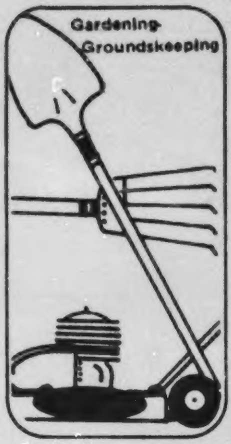
Check the student's performance in the following elements of hauling and spreading topsoil.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Set and marked grade stakes for proper depth.	[ ]	[ ]	[ ]	[ ]
2. Chose path for hauling topsoil.	[ ]	[ ]	[ ]	[ ]
3. Loaded and dumped topsoil in proper area.	[ ]	[ ]	[ ]	[ ]
4. Spread topsoil to desired depth.	[ ]	[ ]	[ ]	[ ]
5. Packed and leveled topsoil to desired depth.	[ ]	[ ]	[ ]	[ ]
6. Removed grade stakes.	[ ]	[ ]	[ ]	[ ]
7. Cleaned and stored all tools and equipment.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No.46



PEAT
Preparing &
Improving Soils

CONVERTING SUBSOIL TO TOPSOIL

Objective No. 83

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping it is sometimes necessary to convert subsoil to topsoil. Often the topsoil on a piece of land is sold leaving the subsoil as the top layer. Erosion may occur leaving very little, if any, topsoil. In these cases and others, you must make the subsoil suitable for plant growth. This may be achieved by adding certain materials to the soil so that the soil will hold water, hold and exchange air, have the proper pH, drain well, have proper elements, and be structured so roots will penetrate and grow. In this learning activity package one will learn how to convert subsoil to topsoil.

DIRECTIONS

Before you begin to work on this learning activity package, be sure you have completed the learning activity package number 11.

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given an area void of topsoil, necessary materials, plant food and tools, convert subsoil to topsoil. The formulated soil must sustain plant growth during the growing season.

LEARNING ACTIVITIES

1 READ *Handbook on Soils,* p. 42.

or

READ *Landscaping Maintenance and Establishment,* p. 45.

or

READ *Turfgrass Maintenance and Establishment,* p. 127.

or ______________________________

2 CHECK YOUR KNOWLEDGE of converting subsoil to topsoil by taking Student Self-Check.

3 OBSERVE another student (or group of students) as he or she (or they) satisfactorily performs (or perform) and is (or are) checked out on this learning activity package.

4 PRACTICE performing the task of converting subsoil to topsoil.

5 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Follow manufacturer's safety precautions if power equipment is used.

EQUIPMENT NEEDED

1. Tiller
2. Fertilizer and lime or sulphur applicators
3. Seeder
4. Rake
5. Water hose
6. Wheelbarrow

MATERIALS NEEDED

1. Fertilizer
2. Lime or sulphur
3. Organic matter and filler materials
4. Seed
5. Mulch material

INSTRUCTIONS

(1) Have soil tested.

(2) Till subsoil area.

(3) Calculate the size of area being converted.

(4) Figure amount of fertilizer, lime, and/or sulphur according to size of area and soil analysis.

(5) Add fertilizer, lime, and/or sulphur to the area.

(6) Decide on soil conditioners needed.

(7) Add organic matter and filler materials according to needs.

(8) Till soil to a minimum of 6" (15.24 cm).

(9) Allow soil to settle.

(10) Level and smooth area.

(11) Plant area in seed.

(12) Water area uniformly.

(13) Mulch area.

(14) Maintain desired moisture level by adding water.

STUDENT SELF-CHECK
DO NOT WRITE ON THIS SHEET
CONVERTING SUBSOIL TO TOPSOIL

Check True or False.

1. Topsoil is better for plant growth than untreated subsoil.

   True ___ False ___

2. Heavy subsoils (clay) must be loosened up when converting to topsoil by adding filler materials like sand.

   True ___ False ___

3. The fertility of the subsoil will probably be low when you are converting it to topsoil so fertilizer will have to be added.

   True ___ False ___

4. A good topsoil or converted subsoil should drain well, hold and exchange air, and be structured so roots will penetrate and grow.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, CONVERTING SUBSOIL TO TOPSOIL.

Convert subsoil to topsoil.

CORRECT RESPONSES

1. True 2. True 3. True 4. True

LAP 46

Student ____________________

Date ____________________

DO NOT WRITE ON THIS SHEET

CONVERTING SUBSOIL TO TOPSOIL

Instructor's Final Checklist

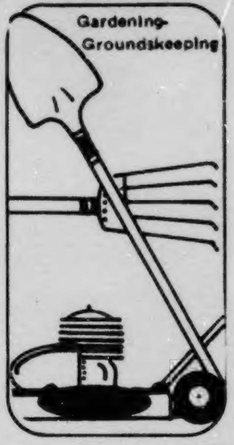
Check the student's performance in the following elements of converting subsoil to topsoil.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Had soil tested.	☐	☐	☐	☐
2. Added the proper elements to the soil according to soil test.	☐	☐	☐	☐
3. Added organic matter and filler materials properly.	☐	☐	☐	☐
4. Tilled soil at least 6" (15.24 cm) and mixed all additives thoroughly.	☐	☐	☐	☐
5. Gave soil ample time to settle.	☐	☐	☐	☐
6. Leveled and smoothed area.	☐	☐	☐	☐
7. Seeded area.	☐	☐	☐	☐
8. Watered properly.	☐	☐	☐	☐
9. Mulched area properly.	☐	☐	☐	☐
10. Kept moisture level at desired amount.	☐	☐	☐	☐

Learning Activity Package No. 47



PEAT
Preparing & Improving Soils

STERILIZING SOIL WITH LIQUID SOIL FUMIGANTS

Objective No. 84

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping, the use of liquid soil fumigants is often necessary to control organisms in the soil. Some of the soil organisms that may hinder a grower's crop are insects, nematodes, weeds, fungi, and bacteria. When growing "high-cash" crops that are sensitive to many pests, you cannot afford to ignore the sterilization program.

The chemical that you choose to use depends primarily on the pest or pests that need to be controlled. These chemicals are dangerous and need to be handled and applied correctly to guarantee the safety of the worker, grower, and the consumer. In this learning activity, you will learn how to sterilize soil with a liquid soil fumigant.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a soil area and the necessary tools and equipment, sterilize the soil with a liquid soil fumigant. The amount recommended by the manufacturer should be applied at 10" (25.40 cm) intervals to a depth of 6" (15.24 cm).

LEARNING ACTIVITIES

1 READ *Nursery Management*, Volume 1, pp. 45-49.

or

2 READ *Greenhouse Flowers and Bedding Plants For Agribusiness Studies*, pp. 45-49.

or

3 READ *Ball Red Book*, p. 108-117.

or ______________________________

4 CHECK YOUR KNOWLEDGE of sterilizing soil with liquid soil fumigants by taking Student Self-Check.

5 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 PRACTICE performing the task of sterilizing soil with liquid soil fumigants.

7 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY *

1. Always read the label before using pesticides. Note warnings and cautions each time before opening a container. *Read and follow directions for use.*

2. Keep pesticides away from children, pets and irresponsible people. Store pesticides in a secure place away from food and feed.

3. Do not smoke while using pesticides and avoid inhalation.

4. Do not spill pesticides on skin or clothing. If they are spilled, remove contaminated clothing and wash exposed skin areas thoroughly.

5. Dispose of empty containers so that they pose no hazard to humans, animals, or valuable plants.

6. If symptoms of illness occur during or shortly after using pesticides, call a physician or get the patient to a hospital immediately. Physicians now have available information for the quick and effective treatment of accidental overexposure to pesticides. If possible, take along a label from the pesticide container.

7. You may obtain prompt up-to-date information on the symptoms and treatment of cases resulting from exposure to toxic agricultural chemicals by calling your "Poison Control Center."

8. Read state regulations regarding buying and applying pesticides.

***Items 1–7 taken from *The Ball Red Book*, page 112.**

EQUIPMENT NEEDED

1. Applicator
2. Shovels
3. Bar or tool to punch holes
4. Safety equipment recommended on label and/or by teacher.

MATERIALS NEEDED

1. Liquid soil fumigant
2. Polyethylene cover
3. Material to hold cover

INSTRUCTIONS

(1) Lay off area in 10" (25.40 cm) squares.

(2) Punch 6" (15.24 cm) deep hole in each square.

(3) Pour recommended amount of fumigant in each hole.

(4) Cap with soil.

(5) Sprinkle fumigant on entire area.

(6) Cover area with polyethylene cover.

The chemical that is used will dictate the method of preparing the soil and applying the chemical. The instructor will change the above instruction to correspond to the chemical being used.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

STERILIZING SOIL WITH LIQUID SOIL FUMIGANTS

Check True or False.

1. Liquid soil fumigants are used to control organisms in the soil.

   True ___ False ___

2. One should use extreme caution when using chemical fumigants.

   True ___ False ___

3. It is not necessary to read the label on the chemical container.

   True ___ False ___

4. Soil fumigation is not necessary on "high-cash" crops because pests are rarely a problem.

   True ___ False ___

5. You may ignore the recommended amount and use the amount of chemical you feel is necessary.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist STERILIZING SOIL WITH LIQUID SOIL FUMIGANTS.

Using a liquid soil fumigant, sterilize the soil.

CORRECT RESPONSES

1. True 2. True 3. False 4. False 5. False

DO NOT WRITE ON THIS SHEET

LAP 47

Student ____________________

Date ____________________

STERILIZING SOIL WITH LIQUID SOIL FUMIGANTS

Instructor's Final Checklist

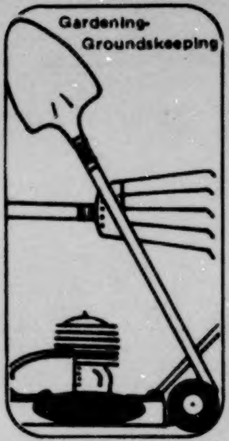
Check the student's performance in the following elements of sterilizing soil with liquid soil fumigants.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Marked and prepared soil properly.	☐	☐	☐	☐
2. Applied recommended amount of chemical.	☐	☐	☐	☐
3. Covered total area with chemical.	☐	☐	☐	☐
4. Covered area properly.	☐	☐	☐	☐
5. Observed all safety precautions.	☐	☐	☐	☐
6. Cleaned and stored all materials and equipment.	☐	☐	☐	☐

Learning Activity Package No.48



PEAT
Preparing &
Improving Soils

STERILIZING SOIL WITH GRANULAR OR POWDER CHEMICALS

Objective No. 85

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping, the use of granular or powder chemicals is often necessary to control organisms in the soil. Some of the soil organisms that may hinder a grower's crops are insects, nematodes, weeds, fungi, and bacteria. When growing "high-cash" crops that are sensitive to many pests, you cannot afford to ignore the sterilization program.

The chemical that you choose to use depends primarily on the pest or pests you need to control. These chemicals are dangerous and need to be handled and applied correctly, to guarantee the safety of the worker, grower, and the consumer. In this learning activity, you will learn how to sterilize soil with a granular or powder chemical.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a soil area and the necessary tools and equipment, sterilize the soil with granular or powdered chemical. Coverage of manufacturer-recommended amounts should be uniform.

LEARNING ACTIVITIES

1 READ the following:

Ball Red Book, p. 108-117.

or____________________________

2 CHECK YOUR KNOWLEDGE of sterilizing soil with granular or powder chemicals by taking Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of sterilizing soil with granular or powder chemicals.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY *

1. Always read the label before using pesticides. Note warnings and cautions each time before opening a container. *Read and follow directions for use.*
2. Keep pesticides away from children, pets and irresponsible people. Store pesticides in a secure place away from food and feed.
3. Do not smoke while using pesticides and avoid inhalation.
4. Do not spill pesticides on skin or clothing. If they are spilled, remove contaminated clothing and wash exposed skin areas thoroughly.
5. Dispose of empty containers so that they pose no hazard to humans, animals or valuable plants.
6. If symptoms of illness occur during or shortly after using pesticides, call a physician or get the patient to a hospital immediately. Physicians now have available information for the quick and effective treatment of accidental overexposure to pesticides. If possible, take along a label from the pesticide container.
7. You may obtain prompt, up-to-date information on the symptoms and treatment of cases resulting from exposure to toxic agricultural chemicals by calling your "Poison Control Center."
8. Read and follow state regulations regarding buying and applying pesticides.

EQUIPMENT NEEDED

1. Tiller
2. Applicator

MATERIALS NEEDED

1. Chemical
2. Polyethylene cover
3. Material to hold cover

INSTRUCTIONS

(1) Determine size of area to be treated.

(2) Determine amount of chemical to be applied to the area in accordance with the label.

(3) Till area to recommended depth.

(4) Set applicator and apply chemical evenly over entire area.

(5) Till soil to recommended depth.

(6) Cover if necessary.

The chemical that is used will dictate the method of preparing the soil and applying the chemical. The instructor will change the above instructions to correspond to the chemical being used.

STUDENT SELF-CHECK
DO NOT WRITE ON THIS SHEET
STERILIZING SOIL WITH GRANULAR OR POWDER CHEMICALS

Check True or False.

1. Powder or granular chemicals are used to control organisms in the soil.

   True ___ False ___

2 You should be extremely cautious when using chemical fumigants.

   True ___ False ___

3. It is not necessary to read the label on the chemical container.

   True ___ False ___

4. Soil fumigation will aid in reducing some of the problems of growing plants.

   True ___ False ___

5. You may ignore the recommended amount and use the amount of chemical you feel is necessary.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CORRECT RESPONSES

1. True 2. True 3. False 4. True 5. False

***Items 1–7 taken from *The Ball Red Book*, page 112.**

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, STERILIZING SOIL WITH GRANULAR OR POWDER CHEMICALS.

Using a granular chemical, sterilize the soil in a specified area.

DO NOT WRITE ON THIS SHEET

LAP 48

Student ______________________

Date ______________________

STERILIZING SOIL WITH GRANULAR OR POWDER CHEMICALS

Instructor's Final Checklist

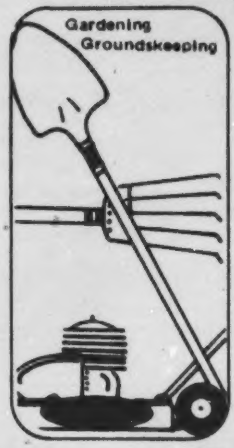
Check the student's performance in the following elements of sterilizing soil with granular or powder chemicals.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Measured area properly.	☐	☐	☐	☐
2.	Determined amount of chemical properly.	☐	☐	☐	☐
3.	Tilled soil thoroughly to recommended depth.	☐	☐	☐	☐
4.	Applied chemical uniformly to area.	☐	☐	☐	☐
5.	Mixed chemical with soil.	☐	☐	☐	☐
6.	Covered soil.	☐	☐	☐	☐
7.	Observed all safety precautions.	☐	☐	☐	☐
8.	Cleaned and stored all tools and materials.	☐	☐	☐	☐

Learning Activity Package No. 49



PEAT
Preparing &
Improving Soils

PREPARING A SEEDBED FOR LAWN AREAS

Objective No. 82

Ornamental Horticulture

INTRODUCTION

Proper preparation of the seedbed is a must for a good lawn. Once the grass is up and growing, it is harder to make soil improvements than if it is done before the seeds are planted. Soil testing is a must if you want to know what needs to be added to soil to make it grow properly. In this learning activity package, you will learn how to prepare a seedbed for a lawn area.

DIRECTIONS

Before you begin to work on this learning activity package, be sure you have completed the learning activity package number 11.

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given a soil analysis, plant food and the necessary tools and equipment, prepare a seedbed for a lawn. Tillage depth should extend 5" to 7" (12.70 to 17.78 cm), with a smooth top surface.

LEARNING ACTIVITIES

1. READ *Landscaping the Home and School Grounds,* pp. 63-64.

   or

   READ *Turfgrass Maintenance and Establishment,* pp. 115-130.

   or ______________________________

2. CHECK YOUR KNOWLEDGE of preparing a seedbed for lawn areas by taking Student Self-Check.

3. OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4. PRACTICE performing the task of preparing a seedbed for lawn areas.

5. ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Follow safety precautions listed in previous learning activity packages.

EQUIPMENT NEEDED

1. Tiller
2. Rake
3. Shovel
4. Fertilizer and lime or sulphur applicators
5. Wheelbarrow

MATERIALS NEEDED

1. Fertilizer
2. Soil conditioners
3. Lime or sulphur

INSTRUCTIONS

(1) Remove all trash and debris from designated area.

(2) Thoroughly till area at least 5" (12.70 cm).

(3) Calculate lawn area.

(4) Interpret soil analysis and calculate amount of fertilizer, lime and/or sulphur needed.

(5) Determine if any soil conditioners are needed (sand, peat moss, etc.).

(6) Add soil conditioners if necessary.

(7) Add fertilizer, lime, and/or sulphur as recommended uniformly over entire area.

(8) Till entire area thoroughly.

(9) Level and smooth area.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

PREPARING A SEEDBED FOR LAWN AREAS

Check True or False.

1. Proper preparation of a seedbed is a must for good lawns.

   True ___ False ___

2. A soil test or analysis is not needed when preparing a seedbed for a lawn.

   True ___ False ___

3. It is easier to correct soil problems after the seeds are planted and established than before planting.

   True ___ False ___

4. Soil conditioners are not usually needed because clay soils or sandy soils will grow any type of grass.

   True ___ False ___

5. All materials that are added to the soil need to be thoroughly tilled into soil.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statements below explain the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, PREPARING A SEEDBED FOR LAWN AREAS.

Prepare a seedbed for a lawn in an area identified by your instructor.

CORRECT RESPONSES

1. True 2. True 3. False 4. False 5. True

DO NOT WRITE ON THIS SHEET

LAP 49

Student ______________________

Date ______________________

PREPARING A SEEDBED FOR LAWN AREAS

Instructor's Final Checklist

Check the student's performance in the following elements of preparing a seedbed for lawn areas.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Removed all debris from designated area.	☐	☐	☐	☐
2. Tilled area between 5" and 7" (12.70 and 17.78 cm).	☐	☐	☐	☐
3. Interpreted soil test properly.	☐	☐	☐	☐
4. Calculated lime, sulphur and/or fertilizer properly.	☐	☐	☐	☐
5. Determined conditioners.	☐	☐	☐	☐
6. Applied all additives uniformly over entire area.	☐	☐	☐	☐
7. Tilled all additives into the soil.	☐	☐	☐	☐
8. Leveled and smoothed area.	☐	☐	☐	☐

Learning Activity Package No.50

Gardening-
Groundskeeping

PEAT
Preparing &
Improving Soils

CONTROLLING SOIL EROSION
CAUSED BY WATER

Objective No. 77

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping, the control of soil erosion caused by water can be a major problem in many areas. Loss of valuable topsoil by erosion is not only expensive, wasteful, and unsightly, it often leads to other serious problems. Many maintenance problems stem from poor construction of roads and poor design of slopes and drainage areas. Often one or more simple practices could have avoided the problem, but they are ignored. In this learning activity package, you will learn how to recognize the problem of soil erosion caused by water and recommend ways to control or remedy the situation.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a sloping area eroded by water, list a minimum of 5 ways that erosion can be prevented or remedied. For satisfactory performance, at least 5 student responses must match those in the instructor checklist.

LEARNING ACTIVITIES

1 READ one of the following:

Grounds Maintenance Handbook, pp. 327-362, 1970 ed.; 415-452, 1977 ed.

or

Soils - An Introduction to Soils and Plant Growth, p. 233-239.

or

Soil Classification and Treatment, p. 20-23, 49-53.

or ____________________

2 CHECK YOUR KNOWLEDGE of controlling soil erosion caused by water by taking the Student Self-Check.

3 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

No special safety precautions needed.

EQUIPMENT NEEDED

None

MATERIALS NEEDED

None

INSTRUCTIONS

(1) List areas on school ground or community that need some type of erosion control program.

(2) Decide how you would treat each area listed.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

CONTROLLING SOIL EROSION CAUSED BY WATER

Check True or False.

1. Soil erosion by water usually is a direct result of poor design or management of a particular area.

   True ___ False ___

2. Soil erosion by water is expensive and wasteful.

   True ___ False ___

3. Topsoil that is lost in erosion is easily replaced by nature.

   True ___ False ___

4. Soil erosion is only a problem on steep slopes.

   True ___ False ___

5. Cover crops are used to control erosion caused by water.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, CONTROLLING SOIL EROSION CAUSED BY WATER.

List 5 ways that a soil area eroded by water can be controlled or remedied.

CORRECT RESPONSES

1. True 2. True 3. False 4. False 5. True

DO NOT WRITE ON THIS SHEET

LAP 50

Student ______________________

Date ______________________

CONTROLLING SOIL EROSION CAUSED BY WATER

Instructor's Final Checklist

Check the student's performance in the following elements of controlling soil erosion caused by water.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Planted cover crops.	☐	☐	☐	☐
2. Rotated cover crops.	☐	☐	☐	☐
3. Constructed terraces.	☐	☐	☐	☐
4. Constructed artificial barriers.	☐	☐	☐	☐
5. Sodded waterways.	☐	☐	☐	☐
6. Constructed cross-drainage ways.	☐	☐	☐	☐

Learning Activity Package No.51

Gardening-Groundskeeping

PEAT
Preparing & Improving Soils

AERATING SOD

Objective No. 76

Ornamental Horticulture

INTRODUCTION

Home lawns and other turf areas often require a special practice called aerification. This process is to loosen the soil under the turf without disturbing the turf to any great degree. Aerating soil is necessary because rainfall, artificial watering, and traffic by people and maintenance equipment tend to compact the soil. In this learning activity package you will learn how to operate and maintain the equipment needed to aerate soil.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, complete the Learning Activities in the order given.

OBJECTIVE

Given a compacted lawn area and an aerator, aerate the soil within the area. Complete coverage will be evidenced by soil cores deposited uniformly over the area.

LEARNING ACTIVITIES

1 READ "Aeration" – *Turfgrass Maintenance and Establishment,* pp. 108-109.

or

Turf Management Handbook, p. 143.

or

Grounds Maintenance Handbook, pp. 49-51, 173-175, 1958 ed., pp. 68-69 and 226-227.

or____________________________

2 CHECK YOUR KNOWLEDGE of aerating sod by taking the Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of aerating sod.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Read safety recommendations that come with equipment.

EQUIPMENT NEEDED

1. Aerator
2. Steel mat or rake
3. Rake, sweeper, or reel mower with grass catcher

MATERIALS NEEDED

None needed.

INSTRUCTIONS

(1) Check oil and fuel levels on equipment.

(2) Set equipment for operation.

(3) Determine direction of travel.

(4) Cover area completely with aerator. Clean tines as necessary.

(5) Drag surface with steel mat or rake.

(6) Remove loose pieces of turf with rake, sweeper, or mower.

(7) Clean equipment thoroughly and inspect for damaged or broken parts.

(8) Replace broken or damaged parts, including tines.

(9) Store all tools and equipment in proper place.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET
AERATING SOD

Check True or False.

1. Aeration of the soil refers to any means to loosen the soil to some depth; not just surface scratching.

   True ___ False ___

2. Aeration of the soil becomes necessary when a soil becomes compacted and water, air and minerals cannot penetrate to the root system.

   True ___ False ___

3. The best kind of aerator is one that spikes rather than removes soil cores.

   True ___ False ___

4. The machines used to aerate soil and relieve compaction do the job without disturbing the turf surface.

   True ___ False ___

5. The name of the part of the aerator that removes the soil is a tine or spoon.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, AERATE SOD.

Aerate a lawn area defined by your instructor.

CORRECT RESPONSES

1. True 2. True 3. False 4. True 5. True

DO NOT WRITE ON THIS SHEET

LAP 51

Student ____________________

Date ____________________

AERATING SOD
Instructor's Final Checklist

Check the student's performance in the following elements of aerating sod.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Checked equipment before starting.	☐	☐	☐	☐
2. Set equipment for operation.	☐	☐	☐	☐
3. Determined direction of travel.	☐	☐	☐	☐
4. Covered area completely with aerator.	☐	☐	☐	☐
5. Broke cores up and integrated back into the turf.	☐	☐	☐	☐
6. Removed loose pieces of turf.	☐	☐	☐	☐
7. Cleaned equipment.	☐	☐	☐	☐
8. Replaced all broken and damaged parts.	☐	☐	☐	☐
9. Stored tools and equipment properly.	☐	☐	☐	☐

Learning Activity Package No. 52

Gardening-Groundskeeping

PEAT
Preparing & Improving Soils

APPLYING FERTILIZER BY THE "PUNCH BAR" METHOD

Objective No. 86

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping it is necessary to fertilize established trees that are not growing with much vigor. Lawns and shrubs often receive the proper amount of fertilizer, but trees in a landscape are usually not given the proper amount of nutrients. A different method is employed to fertilize trees properly. The "punch bar" method is an excellent way to get the fertilizer in the root zone. Cultivation is not a good way because it may damage the root system. In this learning activity package, you will learn how to apply fertilizer by the "punch bar" method.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given an established tree (3 to 8 inches in diameter) (7.62 to 20.32 cm) with a shoot growth rate of less than 8 to 12 inches (20.32 to 30.48 cm) per season, fertilize the tree with 4 to 5 lbs. (2 kg) of mild fertilizer, using the "punch bar" method. The fertilizer must be applied equally to root areas throughout and 24" (60.96 cm) beyond the "drip" line of the tree.

LEARNING ACTIVITIES

1 READ one of the following:

Landscape Maintenance and Establishment, pp. 19 and 20.

or ____________________

Care of Ornamental Plants,

or ____________________

2 CHECK YOUR KNOWLEDGE of applying fertilizer by the "punch bar" method by taking Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of applying fertilizer by the "punch bar" method.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

No special safety precautions are necessary.

EQUIPMENT NEEDED

Crowbar, a length of pipe or soil auger

MATERIALS NEEDED

1. Adequate amount of complete fertilizer
2. Porous topsoil

INSTRUCTIONS

(1) Punch 2" (5.08 cm) diameter holes 12" - 18" (30.48 - 45.72 cm) deep, 18" - 24" (45.72 - 60.96 cm) apart.

(2) Holes should extend at least 24" (60.96 cm) past dripline of tree.

(3) Determine approximate amount of fertilizer required for each hole.

(4) Equally distribute fertilizer in each hole.

(5) Irrigate holes thoroughly.

(6) Cap each hole with porous topsoil.

(7) Clean all tools and equipment.

(8) Store equipment, tools, and materials in proper places.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

APPLYING FERTILIZER BY THE "PUNCH BAR" METHOD

Check True or False.

1. All holes should be located close to the trunk of the tree.

   True ___ False ___

2. Holes should be approximately 12" - 18" (30.48 - 45.72 cm) deep and 18" - 24" (45.72 - 60.96 cm) apart.

   True ___ False ___

3. A complete fertilizer is recommended for use with the "punch bar" method.

   True ___ False ___

4. By filling and capping the holes with a porous topsoil, little water will drain through and reach the fertilizer.

   True ___ False ___

5. It is not important to distribute the fertilizer equally to each hole.

   True ___ False ___

6. Up to four pounds of fertilizer should be used for trees with a DBH greater than 6"(15.24 cm).

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, APPLYING FERTILIZER BY THE "PUNCH BAR" METHOD.

Fertilize a tree identified by your instructor using the "punch bar" method.

CORRECT RESPONSES

1. False 2. True 3. True 4. False 5. False
6. True

DO NOT WRITE ON THIS SHEET

LAP 52

Student ____________________

Date ____________________

APPLYING FERTILIZER BY THE "PUNCH BAR" METHOD

Instructor's Final Checklist

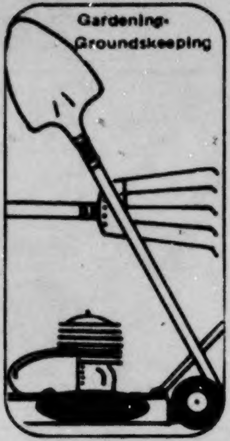
Check the student's performance in the following elements of applying fertilizer by the "punch bar" method.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Punched holes 12" - 18" (30.48 - 45.72 cm) deep.	[ ]	[ ]	[ ]	[ ]
2.	Spaced holes properly.	[ ]	[ ]	[ ]	[ ]
3.	Located holes where the majority of feeder roots are.	[ ]	[ ]	[ ]	[ ]
4.	Used the correct amount of fertilizer.	[ ]	[ ]	[ ]	[ ]
5.	Distributed fertilizer equally.	[ ]	[ ]	[ ]	[ ]
6.	Filled and capped all holes properly.	[ ]	[ ]	[ ]	[ ]
7.	Cleaned and stored all tools, equipment, and materials properly.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No.53



Operating Equipment

MOWING GRASS WITH A ROTARY MOWER

Objective No. 121

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing grounds work is to mow the grass with a rotary mower.

Grass must be kept mowed to a height that makes for a good appearance and is practical in the use of the grounds.

In this learning activity package you will learn to use the rotary mower, the height to cut the grass, and something about the method of cutting.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a Bermuda Grass lawn area, a rotary mower, and operating instructions, mow the grass within the confines of the area. The grass height should be within ± 1/4 inch of the recommendations of the state experiment station for cutting Bermuda grass on the lawn area.

LEARNING ACTIVITIES

1 READ *Landscaping the Home and School Grounds,* (State Department of Education, Office of Vocational Education, Vocational Agricultural Section) Section 5, pp. 67-68.

2 CHECK YOUR KNOWLEDGE of mowing Bermuda grass lawns by taking Student Self-Check, "Mow Grass with Rotary Mower".

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of mowing a Bermuda grass lawn. Follow the procedure outlined in Learning Activity 1.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Screen the area to be mowed for rocks, bottles, wire or other objects which could cause injury. Make sure safety guards are in place.

EQUIPMENT NEEDED

Rotary lawn mower

MATERIALS NEEDED

1. 30 w motor oil
2. Kerosene for cleaning air filter
3. Owner's manual for lawn mower

INSTRUCTIONS

MOWING GRASS WKTH A ROTARY MOWER

(1) Set height of cut for mower blade.

(2) Perform preliminary machine maintenance as specified by manufacturer.

(4) Set throttle control.

(5) Determine starting point and direction of travel.

(6) Start engine.

(7) Mow grass within area. Caution, watch for rocks, sticks, bottles, cans and other debris which could cause injury to operator or bystanders. If possible, keep discharge chute pointed away from people, buildings, walkways, streets and cars.

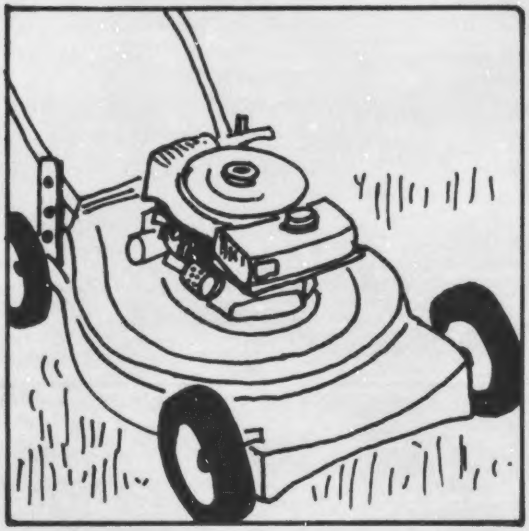


Figure 1. A typical rotary mower. Ideal for cutting the coarser texture grasses.

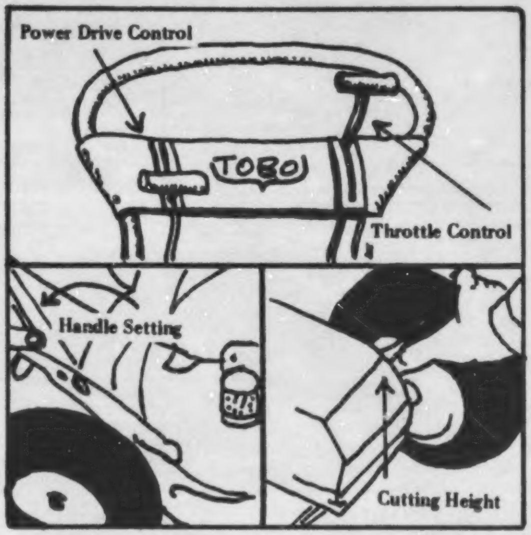


Figure 2. The typical rotary mower has only three major operational controls – speed, handle position and cutting height. Some mowers are self-propelled and will have a power drive control.

STUDENT SELF CHECK

MOWING GRASS WITH A ROTARY MOWER

DO NOT WRITE ON THIS SHEET

Answer the following:

(1) You should always check the oil level in the engine crankcase before starting the engine.

True_____ False _____

(2) Bermuda grass should be mowed to a height of:
   (a) 4 inches
   (b) 3 inches
   (c) 1/2-1 inch

(3) We should never cut off more than 1/4 to 1/3 of the total leaf surface at one mowing.

True ____ False_____

(4) Why is it so important to avoid pushing the lawn mower over any debris?

(5) Name four places we should avoid pointing the discharge chute.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Using a rotary mower, mow the Bermuda grass in the area marked with blue flags.

CORRECT RESPONSES

1. True. The engine could be damaged if oil level is too low
2. (c) 1/2 to 1 inch
3. True. Cutting too much leaf surface at one time greatly reduces photosynthesis.
4. It is dangerous to operators, bystanders, automobiles, and other property.
5. People, buildings, cars, walkways, and streets.

DO NOT WRITE ON THIS SHEET

LAP 53

Student ____________________

Date ____________________

MOWING GRASS WITH A ROTARY MOWER

Instructor's Final Checklist

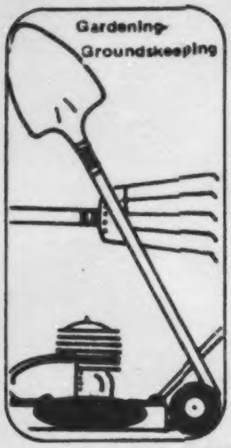
Check the student's performance in the following elements of mowing grass with a rotary mower.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Machine maintenance was performed.	☐	☐	☐	☐
2.	Engine maintenance was performed.	☐	☐	☐	☐
3.	Oil level in engine was checked.	☐	☐	☐	☐
4.	Air cleaner was checked to determine need for cleaning.	☐	☐	☐	☐
5.	Student avoided any debris on the ground, while mowing, that could be hazardous.	☐	☐	☐	☐
6.	Student traveled in the right direction while mowing.	☐	☐	☐	☐
7.	Student set mower blade at correct height.	☐	☐	☐	☐

Learning Activity Package No.54



Operating Equipment

MOWING GRASS WITH A REEL-TYPE MOWER

Objective No. 120

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing groundswork is to mow the grass with a reel-type mower. Grass must be kept mowed to a height that makes for a good appearance and is practical in the use of the grounds. In this learning activity package you will learn to use the reel-type mower, the height to cut the grass, and something about the method of cutting.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a Bermuda grass lawn area, a self-propelled reel-type mower, and a manufacturer's manual,

(1) Mow the grass within the confines of the area.

(2) The grass height should be within ± ¼" (6 mm) of the recommendations of a state experiment station for cutting Bermuda Grass on the lawn area.

LEARNING ACTIVITIES

1 READ "Landscaping the Home and School Grounds," (State Dept. Ed., Office of Voc. Ed., Voc. Agric. Sec.) Section 5, pp. 67-68.

or ______________________________

2 READ Table 4, "Cutting Heights for Lawn Grasses."

or ______________________________

3 READ the Instructions, MOWING GRASS WITH A REEL-TYPE MOWER.

or ______________________________

4 CHECK YOUR KNOWLEDGE of mowing Bermuda grass lawn by taking the Student Self-Check, MOWING GRASS WITH A REEL-TYPE MOWER.

5 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 **PRACTICE** performing the task of mowing a Bermuda grass lawn. Follow the procedure outlined in Learning Activity 2.

7 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activities.

EQUIPMENT NEEDED

Reel-type mower

MATERIALS NEEDED

1. 30W motor oil
2. Kerosene for cleaning air filter
3. Owner's Manual for reel-type lawn mower

SAFETY

Keep hands and feet clear of the machinery when in motion.

INSTRUCTIONS

MOWING GRASS WITH A REEL-TYPE MOWER

(1) Set height of cut for mower blade.

(2) Perform preliminary machine maintenance as specified by manufacturer.

(3) Perform preliminary engine maintenance as specified in manufacturer's manual.

(4) Move all controls to disengaged position, using manufacturer's manual for specific instructions.

(5) Determine starting point and direction of travel.

(6) Start engine.

(7) Engage controls.

(8) Lower cutting unit(s).

(9) Mow grass in area.

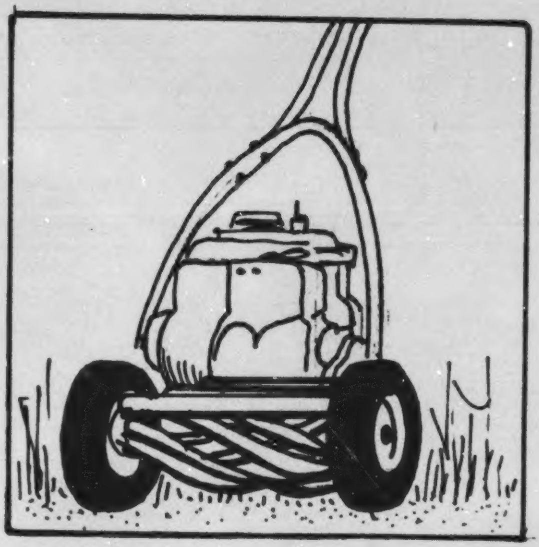


Figure 1. A typical reel-type mower. Reel-type mowers are frequently used on golf courses and athletic fields where a very smooth cut is desired.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

MOWING GRASS WITH A REEL-TYPE MOWER

Answer the following:

1. You should check the oil level in engine crankcase before starting the engine.

   True ___ False ___

2. Bermuda grass should be mowed to a height of:

   a. 4 inches (10 cm)
   b. 3 inches (8 cm)
   c. 1/2 to 1 inch (13 to 25 mm)

3. We should never cut off more than ____________ of the leaf surface at one mowing.

   a. 1/4 to 1/3
   b. 1/2
   c. 3/4

4. Before starting the engine of the reel-type mower, all controls should be

   a. engaged
   b. disengaged

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, MOWING GRASS WITH A REEL-TYPE MOWER.

Mow the Bermuda grass area marked with white flags, using a reel-type, self-propelled mower.

CORRECT RESPONSES

1. True. The engine could be damaged if oil level is too low.
2. c. 1/2 to 1 inch (13 to 25 mm)
3. a. 1/4 to 1/3 of leaf surface at one mowing.
4. Disengaged, for safety reasons.

DO NOT WRITE ON THIS SHEET

LAP 54

Student ____________________

Date ____________________

MOWING GRASS WITH A REEL-TYPE MOWER

Instructor's Final Checklist

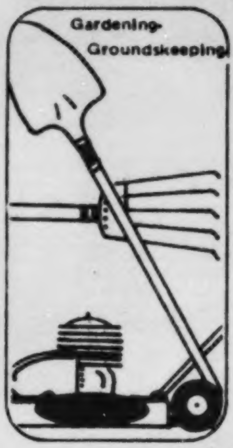
Check the student's performance in the following elements of mowing grass with a reel-type mower.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Set mower blade for correct height of cut.	☐	☐	☐	☐
2.	Performed preliminary machine maintenance.	☐	☐	☐	☐
3.	Performed preliminary engine maintenance.	☐	☐	☐	☐
4.	Disengaged all controls before engine was started.	☐	☐	☐	☐
5.	Lowered cutting unit before beginning to mow grass.	☐	☐	☐	☐
6.	Mowed grass correctly.	☐	☐	☐	☐

Learning Activity Package No. 55



Operating Equipment

EDGING A SIDEWALK WITH A POWER EDGER

Objective No. 115

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing grounds work is to edge a sidewalk with a power edger. Some grasses such as Bermuda, Zoysia and Centipede make runners which will creep onto the sidewalk as they grow. These must be kept trimmed back to the edge of the walk in order to have a neat lawn and walk area. In this learning activity package you will learn to use the power edger to trim the grass along the edge of the walk. Also you will learn to select the proper blade height.

DIRECTIONS

Read the objectives below. If you think you are ready to perform these tasks, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVES

Given 200 feet (61 m) of sidewalk, operator's manual for an edger, and safety glasses:

(1) Trim grass overlapping the sidewalk with a power edger.

(2) The grass should be trimmed even with the edge of the sidewalk bordering the grass.

LEARNING ACTIVITIES

1 READ *Landscape Maintenance* by Scott Wilson, (Voc. Ed. Productions, Calif. State Polytechnic College) Sec. 16, p. 37, Gardening Equipment.

or ______________________

2 READ section on trimming lawns along walks.

or ______________________

READ the Instructions, EDGING SIDEWALK WITH A POWER EDGER.

or ______________________

4 CHECK YOUR KNOWLEDGE of edging sidewalks with a power edger by taking the Student Self-Check.

5 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 **PRACTICE** performing the task of edging a sidewalk. Follow the procedure outlined in Learning Activity 2 and by observing a demonstration by your instructor.

7 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activity.

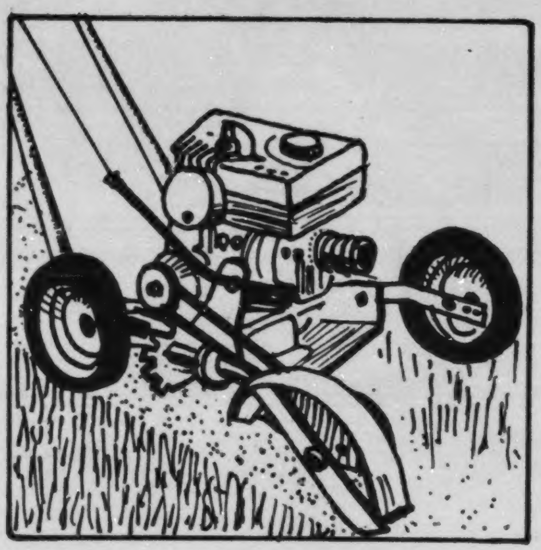


Figure 1. Edgers can be used to mow close to walkways, flower beds, cemetery monuments, buildings, etc.

EQUIPMENT NEEDED

Power edger

MATERIALS NEEDED

30W motor oil
Kerosene for cleaning air filter
Owner's Manual for power edger

SAFETY

Be sure to wear safety goggles and keep hands and feet clear of the blade when in motion.

INSTRUCTIONS

EDGING A SIDEWALK WITH A POWER EDGER

(1) Set edger head to desired position.

(2) Perform machine maintenance as specified in Operator's Manual.

(3) Perform engine maintenance as specified in Operator's Manual.

(4) Start engine.

(5) Select speed, if applicable.

(6) Determine starting point and direction of travel.

(7) Lower blade to edge of sidewalk.

(8) Walk at slow pace while trimming.

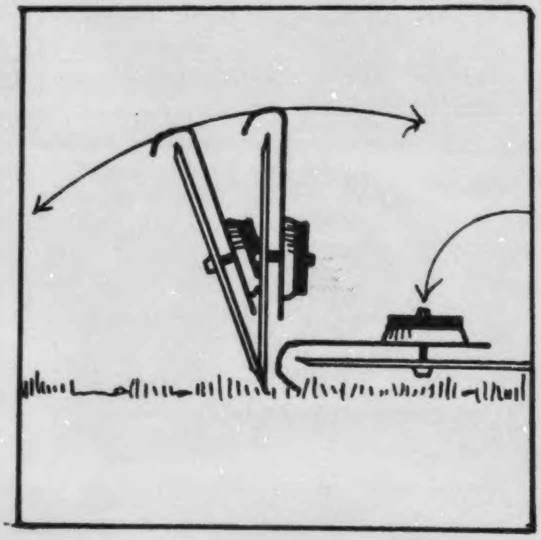


Figure 2. The blade on most edgers is adjustable for various angles – some up to 120 degrees.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

EDGING A SIDEWALK WITH A POWER EDGER

Answer the following.

1. You should check the oil level in the engine crankcase before starting the engine.

   True ___ False ___

2. Edging improves neatness and gives a more manicured look to the lawn area.

   True ___ False ___

3. Two grasses that make runners that creep onto the walk are:

   a. Fescue
   b. Bermuda
   c. Zoysia
   d. Kentucky Blue Grass

4. The blade of the power edger should be made of soft steel in order to make it easy to sharpen.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Using a power edger, trim overlapping grass from the border of a concrete sidewalk identified by your instructor.

CORRECT RESPONSES

1. True. The engine could be damaged if oil level is too low.
2. True
3. b. Bermuda and c. Zoysia grass
4. False. The blade should be hard-surfaced to prevent rapid wear because it sometimes comes into contact with the concrete walk.

DO NOT WRITE ON THIS SHEET

LAP 55

Student ______________________________

Date ______________________________

EDGING A SIDEWALK WITH A POWER EDGER

Instructor's Final Checklist

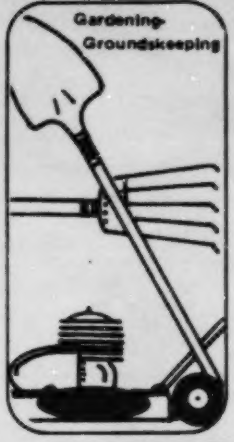
Check the student's performance in the following elements of edging a sidewalk with a power edger.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Performed machine maintenance.	☐	☐	☐	☐
2.	Performed engine maintenance.	☐	☐	☐	☐
3.	Checked engine oil level.	☐	☐	☐	☐
4.	Checked air filter to determine need for cleaning.	☐	☐	☐	☐
5.	Lowered blade to correct level.	☐	☐	☐	☐
6.	Determined direction of travel.	☐	☐	☐	☐
7.	Corrected speed of travel to do a good edging job.	☐	☐	☐	☐

Learning Activity Package No.56



Operating Equipment

PREPARING THE SOIL FOR PLANTING GRASS

Objective No. 117

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing grounds work is to prepare soil for planting grass with a rotary tiller. Soil must be prepared thoroughly if a good seedbed is desired. A rotary tiller is a most important tool for performing this task. In addition, viable seed and good environmental conditions (moisture and temperature) are necessary if you expect to obtain a good stand of lawn grass. In this learning activity package you will learn to use the rotary tiller to the appropriate depth to plow the soil.

DIRECTIONS

Read the objectives below. If you think you are ready to perform these tasks, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVES

Provided with a rotary tiller and equipment operating instructions,

(1) Prepare a 100 sq. ft. plot of soil for planting Bermuda grass. (9.3 sq. m)

(2) The soil should be tilled an average of 6 inches and to a medium tilth. (15 cm)

LEARNING ACTIVITIES

1 READ "Agricultural Cooperative Training, Vocational Agriculture," Agricultural Occupations. Vocational Instructional Services, Texas. Read Section 950-X-5, pp. 2 and 3, "Operating Rotary Tillers Safely and Effectively."

or ______________________________

READ the Instructions, PREPARING THE SOIL FOR PLANTING GRASS.

or ______________________________

2 CHECK YOUR KNOWLEDGE of preparing soil for planting lawn grass by taking the Student Self-Check, PREPARING SOIL WITH A ROTARY TILLER.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

EQUIPMENT NEEDED

Rotary tiller

MATERIALS NEEDED

30W motor oil
Kerosene for cleaning air filter
Owner's Manual for rotary tiller

INSTRUCTIONS

PREPARING THE SOIL FOR PLANTING GRASS

(1) Perform any needed preliminary equipment or engine maintenance specified by manual.

(2) Set tilth, if applicable.

(3) Check stabilizer bars and/or chains for proper fit, if applicable.

(4) Start engine.

(5) Determine starting point and direction of travel.

(6) Engage rotors by adjusting belt or chain levers.

(7) Lower rotors at starting point.

(8) Set throttle at 3/4 speed and allow tiller to set travel speed.

SAFETY

1. Read the operators manual.
2. Never wear sandals or open toed shoes.
3. Keep hands and feet from under tiller while the engine is running.
4. Make sure safety shields or guards are in place and secure.
5. Know how to stop the machine quickly.
6. Keep children away from the tiller.
7. Handle gasoline with care.
8. Remove all bottles, wire, stone or other objects from the area to be tilled.
9. Make sure the clutch is in neutral before starting the engine.
10. Keep a safe distance from fences, trees and buildings.

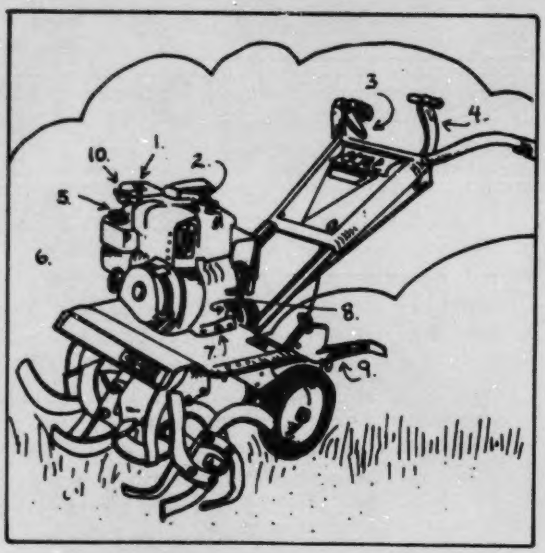


Figure 1. A typical rotary tiller.

1. Speed control lever
2. Spark plug
3. Depth bar release handle
4. Master clutch control
5. Fuel cap
6. Recoil starter
7. Oil drain plug
8. Crankcase oil filler and level plug
9. Depth bar (released position)
10. Air cleaner

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

PREPARING THE SOIL FOR PLANTING GRASS

Answer the following.

1. You should check the oil level in the engine crankcase before starting the engine.

   True ___ False ___

2. Front tine tillers have power wheels.

   True ___ False ___

3. If the tiller must be held back to do a proper job of tilling, the depth bar should be

   a. raised
   b. lowered

4. Final tilling passes should be at __________ angles to previous ones to break up lumps better.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Using the rotary tiller designated by your instructor, prepare a soil plot to plant Bermuda grass.

CORRECT RESPONSES

1. True. The engine could be damaged if oil level is too low.
2. False. The front tine tillers do not have power wheels.
3. b. lowered
4. right

DO NOT WRITE ON THIS SHEET

LAP 56

Student ______________________

Date ______________________

PREPARING THE SOIL FOR PLANTING GRASS

Instructor's Final Checklist

Check the student's performance in the following elements of preparing the soil for planting grass.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Performed machine and engine maintenance.	[ ]	[ ]	[ ]	[ ]
2. Checked oil level in engine.	[ ]	[ ]	[ ]	[ ]
3. Checked air cleaner to determine need for cleaning.	[ ]	[ ]	[ ]	[ ]
4. Set depth bar at correct depth to do a proper job of tilling.	[ ]	[ ]	[ ]	[ ]
5. Checked for correct soil moisture when tilling was done.	[ ]	[ ]	[ ]	[ ]
6. Final tilling passes at right angles to previous ones to further break down lumps.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 57

Gardening-
Groundskeeping

Operating Equipment

APPLYING FERTILIZER WITH DROP-TYPE HOPPER SPREADER

Objective No. 107

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping work is to apply fertilizer with a drop-type hopper spreader. In order to properly fertilize a lawn area, you must be able to set and operate the spreader to get proper, uniform and adequate coverage of fertilizer on the turf area. In this learning activity package you will learn how to properly apply fertilizer with the drop-type hopper spreader.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a drop-type hopper spreader, operator's manual, and necessary fertilizer, apply the fertilizer over an area of soil. The application should be made uniformly over the plot and within ± 3 percent of the recommendations of a state experiment station for the particular plants on the plot.

LEARNING ACTIVITIES

1 READ *Landscape Maintenance* pp. 6-7-8, "Methods of Applying Fertilizers," by Wilson, Voc. Education Productions, Calif. State Polytechnic College.

or ______________________________

Owner's Handbook for the make spreader you have.

or ______________________________

READ the Instructions, APPLYING FERTILIZER WITH DROP-TYPE HOPPER SPREADER.

2 CHECK YOUR KNOWLEDGE of applying fertilizer with a drop-type hopper spreader by taking the Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of applying fertilizer with a drop-type hopper spreader.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY

Wear safety goggles while filling the hopper with fertilizer.

EQUIPMENT NEEDED

Drop-type hopper spreader

MATERIALS NEEDED

Fertilizer of correct analysis

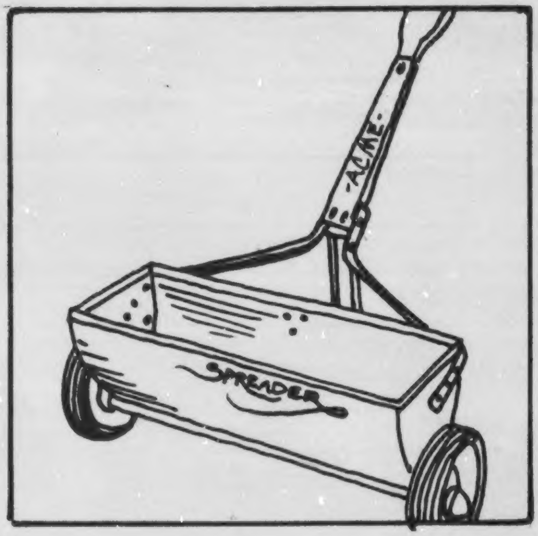


Figure 1. Drop-type hopper spreader – should be cleaned and oiled after each use.

INSTRUCTIONS

APPLYING FERTILIZER WITH A DROP-TYPE HOPPER SPREADER

(1) Check manual for operating instructions.

(2) Determine spreader setting for rate per area.

(3) Close rate gates.

(4) Fill hopper with fertilizer.

(5) Determine direction of travel for uniform application.

(6) Open rate gate after machine is in motion.

(7) Walk at steady, even pace while operating spreader.

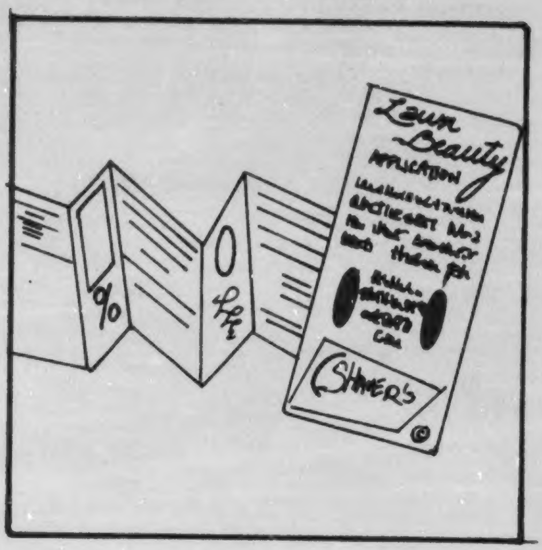


Figure 2. Manufacturer's rate application charts are available.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

APPLYING FERTILIZER WITH DROP-TYPE HOPPER SPREADER

Answer the following.

1. Why should rate gate be closed while hopper is being filled with fertilizer?

2. Why should fertilizer be applied only when grass is dry?

3. Rate gate on spreader should be opened before motion is started.

   True ___ False ___

4. In order to get good fertilizer coverage, spreader should be operated in

   a. one direction
   b. two directions with second being at right angles to first

5. Spreader should have rate gates closed when spreader is stopped.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, APPLYING FERTILIZER WITH DROP-TYPE HOPPER SPREADER.

Apply fertilizer over an area of soil, using a drop-type hopper spreader.

CORRECT RESPONSES

1. Fertilizer will fall through gates if they are open.
2. Fertilizer may burn grass if it is wet.
3. False. Fertilizer will fall through gates and be wasted.
4. b. two directions
5. True. Fertilizer will fall through gates and pile up when spreader is stopped, if gates are left open.

DO NOT WRITE ON THIS SHEET

LAP 57

Student ____________________

Date ____________________

APPLYING FERTILIZER WITH DROP-TYPE HOPPER SPREADER

Instructor's Final Checklist

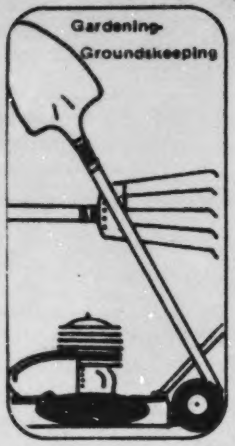
Check the student's performance in the following elements of applying fertilizer with a drop-type hopper spreader.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Checked Owner's Manual for operating instructions.	☐	☐	☐	☐
2. Determined spreader setting for proper rate of applying the fertilizer.	☐	☐	☐	☐
3. Closed rate gates.	☐	☐	☐	☐
4. Filled hopper with fertilizer.	☐	☐	☐	☐
5. Determined direction of travel for uniform fertilizer application.	☐	☐	☐	☐
6. Opened rate gate after spreader was in motion.	☐	☐	☐	☐
7. Walked at a steady pace while operating spreader.	☐	☐	☐	☐

Learning Activity Package No. 58



Operating Equipment

APPLYING FERTILIZER WITH CENTRIFUGAL SPREADER

Objective No. 106

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is applying fertilizer with a centrifugal spreader.

Fertilizer must be applied to lawn and turfgrasses in the proper amounts and spread evenly to get uniform growth.

In this learning activity package you will learn to use the centrifugal spreader. You will learn to set the spreader to apply correct amount of fertilizer evenly over a given area.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activities. Then arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a centrifugal spreader, operator's manual, and the necessary fertilizer materials, apply the fertilizer over a defined area of soil. The application should be made uniformly over the plot and within ±3 percent of the recommendations of the state experiment station for the particular plants on the plot.

LEARNING ACTIVITIES

1 READ Circular 547 "Warm Season Lawn Grasses for South Carolina", Extension Circular, pp. 17 - 18.

or ______________________________

2 READ Circular 528, "Cool Season Lawn Grasses for South Carolina", Extension Circular, pp. 16 - 17.

or ______________________________

3 READ the instructions.

4 CHECK YOUR KNOWLEDGE of applying fertilizer with a centrifugal spreader by taking the Student Self-Check.

5 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 PRACTICE performing the task of applying fertilizer with a centrifugal spreader.

7 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

1. Apply fertilizer only to area assigned.

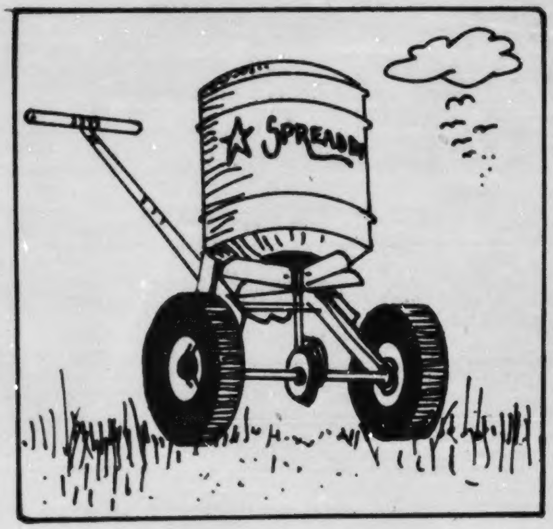
2. Clean fertilizer hopper of spreader thoroughly after using.

EQUIPMENT NEEDED

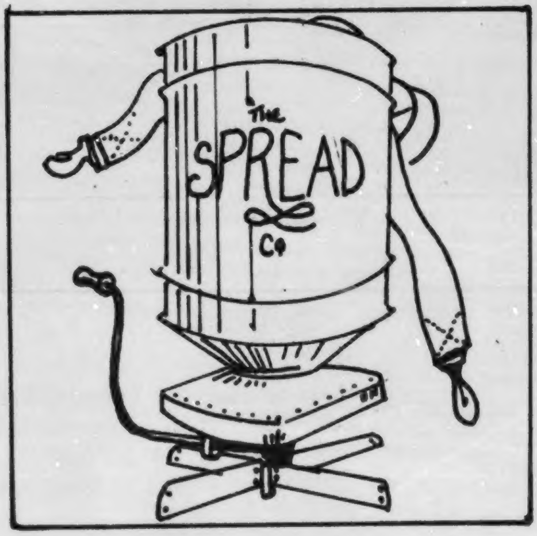
1. Centrifugal spreader
2. Operator's manual for centrifugal spreader

MATERIALS NEEDED

1. Fertilizer, recommended analysis and amount.



Push type spreader



Hand carried type spreader

Figure 1. Types of centrifugal spreader.

INSTRUCTIONS

APPLYING FERTILIZER WITH CENTRIFUGAL SPREADER

(1) Check operator's manual for instructions.

(2) Determine spreader setting for a rate per area.

(3) Close rate gate(s).

(4) Fill hopper with fertilizer.

(5) Determine direction of travel for uniform application.

(6) Open rate gate after machine is in motion.

(7) Walk at steady, even pace while operating spreader.

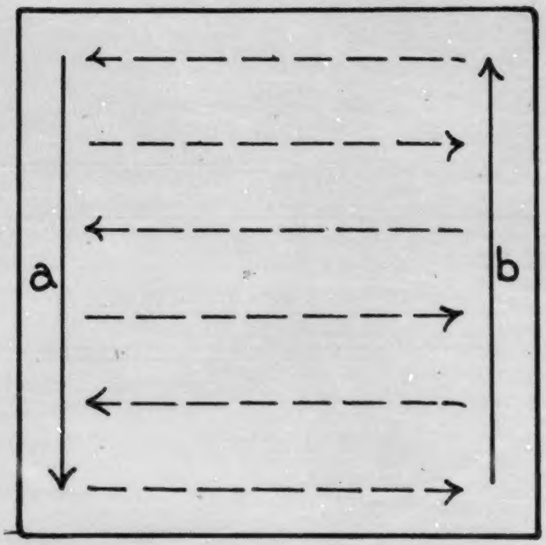


Figure 2. Cover lawn as shown in diagram. Distance between swaths is distance given in SPREADING CHART (WALKING AT NORMAL GAIT). For best results cover area twice – in cross directions at ½ rate. *

*Courtesy of the Cyclone Seeder Co. Inc.

FERTILIZER	Rate	Lbs. per 1000 Sq. Ft.	Micro-Dial Setting	Broadcast Width
American Agricultural Chemical Company Turf 10-6-4	Light	10	4.5	6 ft.
	Medium	15	5.4	
	Heavy	20	6.3	
Agrico 6-10-4	Normal	20	8.2	7 ft.
Agrinite—7% nitrogen	Normal	6	9	6 ft.
American Cyenamid Co. Urea—45% Nitrogen	Light	1	2.9	8 ft.
	Medium	2	3.5	
	Heavy	3	4	
Armour Fertilizer Works Vertagreen Granular 10-10-10	Light	5	4.5	7 ft.
	Medium	10	5.5	
	Heavy	15	6.5	
Best Fertilizers Company Best 11-6-4	Light	10	5.75	
	Normal	15	6.25	
	Heavy	20	7	8 ft.
Borden Company Borden's "38"	Light	6	4.75	
	Medium	10	5.9	
	Heavy	16	7.25	6 ft.
California Spray-Chemical Corp. Ortho 16-16-8	Light	5	4.75	
	Medium	10	5.8	
	Heavy	20	7.3	8 ft.
Corneli Seed Company Turfilizer 9-6	Light	10	5.5	
	Medium	20	7	
	Heavy	26	9	7 ft.
Davison Chemical Co. Wonder-Gro 12-6-6	Half Rate	5	4.25	
	Normal	10	5.4	
	New Lawns	25	6.5	8 ft.
Diamond Fertilizer Company Diamond 10-5-5	Light	8	4.75	
	Medium	10	5.25	
	Heavy	25	7.25	8 ft.
E.I. Dupont de Nemours & Company Nugreen—45% Nitrogen	Light	1	2.75	
	Medium	2	3.5	
	Heavy	3	4	8 ft.
Uramite 38-0-0	Light	6	4.9	
	Medium	10	5.75	
	Heavy	16	6.75	8 ft.

Figure 3. Sample rate chart. Courtesy of the Cyclone Seeder Co., Inc.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

APPLYING FERTILIZER WITH A CENTRIFUGAL SPRAYER

Answer the following:

1. Grasses need the same amount of fertilizers. True False
2. How many directions should be traveled when applying fertilizer with a centrifugal spreader?
3. Why is it important to walk at a steady pace when applying fertilizer with a centrifugal spreader?
4. Why is it important to have the spreader properly set when applying fertilizer?

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Apply fertilizer over an area of soil, using a centrifugal fertilizer spreader.

CORRECT RESPONSES

1. False, refer to experiment station recommendations for individual grasses.
2. Two directions, second direction should be at right angles from the first direction traveled.
3. So that uniform spreading and uniform amounts of the fertilizer are distributed on the area.
4. So that too much or too little fertilizer isn't distributed.

DO NOT WRITE ON THIS SHEET

LAP 58

Student ______________________

Date ______________________

APPLY FERTILIZER WITH CENTRIFUGAL SPREADER

Instructor's Final Checklist

Check the student's performance in the following elements of applying fertilizer with a centrifugal spreader.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Checked operator's manual for proper setting of spreader.	☐	☐	☐	☐
2. Used proper type and amount of fertilizer.	☐	☐	☐	☐
3. Closed rate gate before putting fertilizer in hopper.	☐	☐	☐	☐
4. Opened rate gate after spreader was in motion.	☐	☐	☐	☐
5. Walked at steady pace while operating spreader.	☐	☐	☐	☐
6. Traveled in two directions to obtain uniform spreading of fertilizer.	☐	☐	☐	☐
7. Cleaned hopper after completing the spreading of fertilizer.	☐	☐	☐	☐

Learning Activity Package No.59

Gardening-
Groundskeeping

Operating Equipment

SOWING SEED WITH HAND SEEDER

Objective No. 111

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing grounds work is to sow grass seed with a hand seeder. Grass seed must be sowed at the correct rate and sowed evenly over the area to be seeded. The seedbed should be properly prepared to help insure germination of the seed. In this learning activity package you will learn to seed a lawn properly, using a hand seeder.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a hand seeder and 10 pounds (4.5 kg) of ryegrass seed, sow the seed over a 2/5 acre plot of soil. The seed should be sown at a rate of 25 pounds (11 kg) per acre with uniform coverage.

LEARNING ACTIVITIES

1 READ *Landscaping the Home and School Grounds,* State Dept. of Education, Office of Voc. Ed., Voc. Agric. Sec., p.-66.

or

2 READ *Turfgrass Maintenance and Establishment – A Student Handbook,* pp. 137-141.

or ______________________________

3 READ the Instructions, SOWING SEED WITH HAND SEEDER.

4. CHECK YOUR KNOWLEDGE of seeding with a hand seeder by taking the Student Self-Check.

5 OBSERVE another student as he or she satisfactorily performs and is checked-out on this learning activity package.

6 ARRANGE with your instructor to complete this learning activity by going through the Check-Out Activities.

EQUIPMENT NEEDED

Hand seeder

MATERIALS NEEDED

Seed, designated by instructor
Sand or soil to mix with seed

INSTRUCTIONS

SOWING SEED WITH HAND SEEDER

(1) Determine boundaries for area to be sown.

(2) Set seeder rate gate.

(3) Mix seed with sand or soil in the appropriate amounts to provide better coverage.

(4) Divide seed mixture in half.

(5) Fill seeder with proper amount of seed.

(6) Determine starting point and direction of travel.

(7) Begin walking at normal pace and open rate gate.

(8) Move handle forward in smooth, circular motion for desired sowing action.

(9) Sow half of the seed mixture in one direction.

(10) Sow the other half of the seed while walking in rows at right angles to the first rows.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

SOWING SEED WITH HAND SEEDER

Answer the following.

1. Seed to be sowed should be mixed with a small amount of sand or topsoil.

   True ___ False ___

2. What task should be done on the mechanical seeder before putting seed into it?

3. Why should the seed be divided into two equal parts?

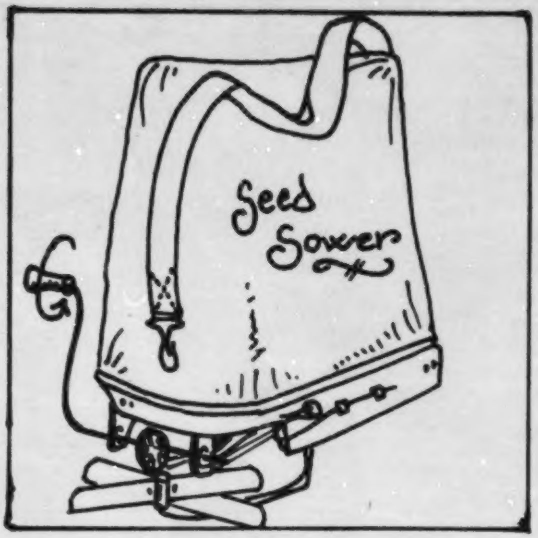


Figure 1. Commonly used type centrifugal hand seeder.

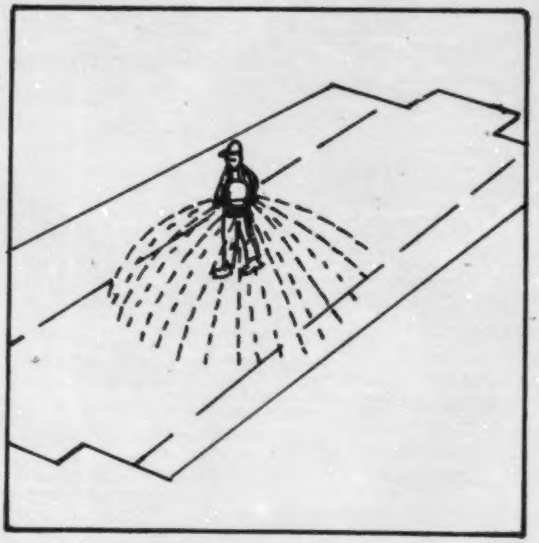


Figure 2. For best results walk at even gait and cover the area twice in a cross direction at ½ rate.

4. Half the seed should be sowed in one direction, and the other half sowed in a crosswise direction to the first sowing.

True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, SOWING SEED WITH HAND SEEDER.

Sow the ryegrass seed over a 2/5 acre plot of soil, using hand seeder.

LAWN SEED	Rate	Lbs. per 1000 Sq. Ft.	Micro-Dial Setting	Broadcast Width
Bent Grass or Redtop	Light Medium Heavy	½ 1 2	1.25 2 2.5	4 ft.
Merion, Delta or Kentucky Bluegrass	Light Medium Heavy	½ 1 2	2.5 3 3.5	4 ft.
Bermuda Grass, unhulled	Light Medium Heavy	1 2 3	3.5 4.0 5.6	4 ft.
Mixtures with only fine seeds	Light Medium Heavy	1 2 3	3.4 4 5.6	4 ft.
Mixtures including coarse seeds	Light Medium Heavy	2 4 6	6 6.5 7	6 ft.
Rye Grasses or Tall Fescue	Light Medium Heavy	2 4 6	6 7 7.75	6 ft.

Figure 3. Sample rate chart. Courtesy of the Cyclone Seeder Co. Inc.

CORRECT RESPONSES

1. True. This gives a little more volume to seed and makes it easier to obtain uniform sowing.
2. Set the seeder at the rate at which you want to seed the area.
3. So that two sowings can be made, one sowing in one direction and the other in a crosswise direction to the first sowing.
4. True. So that you obtain adequate coverage of seed on the area you are seeding.

LAP 59

Student ______________________

Date ______________________

DO NOT WRITE ON THIS SHEET

SOWING SEED WITH HAND SEEDER

Instructor's Final Checklist

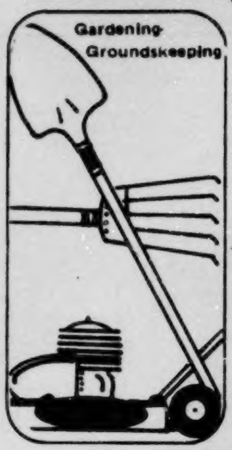
Check the student's performance in the following elements of sowing seed with hand seeder.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Mixed soil or sand with the seed before putting into seeder.	☐	☐	☐	☐
2. Set seeder at correct rate for seed to be sowed.	☐	☐	☐	☐
3. Divided seed into two equal parts before beginning the task.	☐	☐	☐	☐
4. Sowed seed into two different directions.	☐	☐	☐	☐

Learning Activity Package No. 60



Operating Equipemtn

COMPACTING A CULTIVATED AREA OF SOIL WITH LAWN ROLLERS

Objective No. 122

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing groundswork is to compact a cultivated area of soil with a lawn roller.

The practice of rolling the lawn is one which must be handled with great care because so much damage can be done if the principles involved are not understood.

In this learning activity package you will learn to use lawn rollers properly in order for the lawn to get the most benefit from the rolling.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a lawn roller and access to water, compact an area of cultivated soil with the lawn roller. The area must be compacted twice with the roller in a crosswise direction. Each pass of the roller must overlap 12 inches (30.48 cm).

LEARNING ACTIVITIES

1 READ "Approved Practice in Beautifying the Home Grounds." Hoover, (the Interstate Printers and Publishers), Section 9, pp. 101-102.

or ______________________________

2 READ *Turfgrass Maintenance and Establishment*, pp. 139-140.

3 READ the instructions

4 CHECK YOUR KNOWLEDGE of compacting a cultivated area of soil by taking Student Self-Check, "Compact a Cultivated Area of Soil With Lawn Rollers".

or ______________________________

5 OBSERVE another student as he or she satisfactorily performs and is checked-out on this learning activity package.

6 PRACTICE performing the task of compacting a cultivated area of soil with lawn rollers.

7 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Use care on slopes—rollers can "run away" on a down slope.

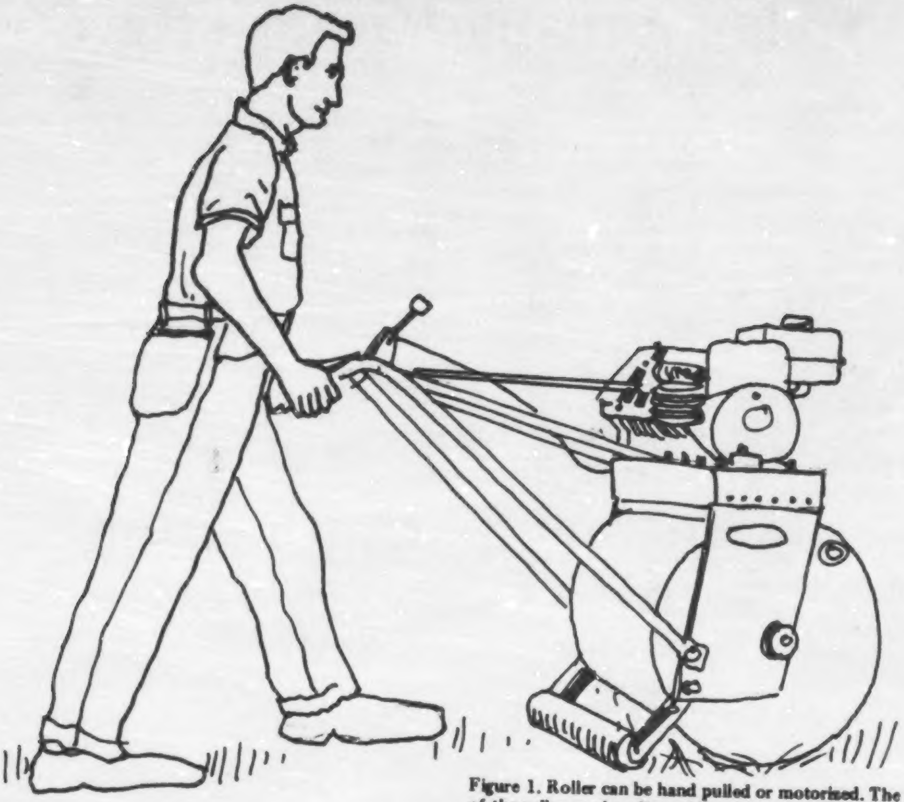
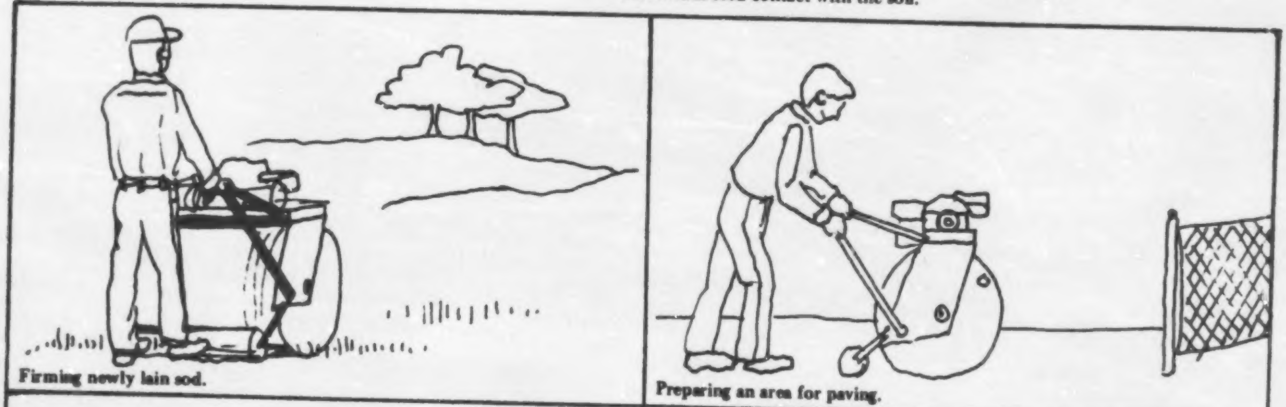
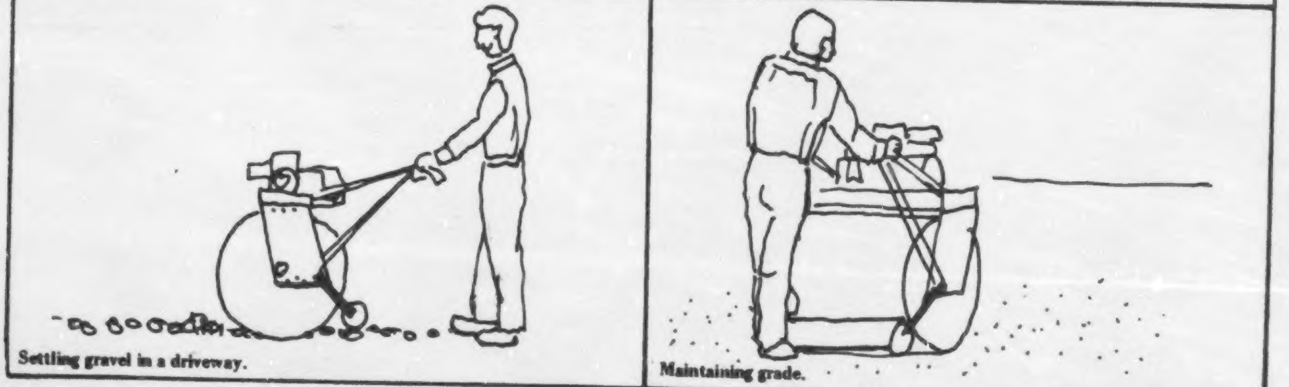


Figure 1. Roller can be hand pulled or motorized. The weight of the roller can be adjusted by adding or draining water. The major purpose of the roller when used after seeding is to insure firm seed contact with the soil.



Firming newly lain sod.

Preparing an area for paving.



Settling gravel in a driveway.

Maintaining grade.

Figure 2. Roller can be used for a variety of tasks.

TOOLS AND EQUIPMENT NEEDED

Lawn roller

MATERIALS NEEDED

Water to fill roller

INSTRUCTIONS

COMPACTING A CULTIVATED AREA OF SOIL WITH A LAWN ROLLER

(1) Determine amount or level to fill roller.

(2) Fill roller to proper level with water.

(3) Determine starting point and direction of travel.

(4) Guide roller uniformly over area, overlapping each path 12" (30.48 cm).

(5) Repeat steps 3 and 4 in opposite or crosswise direction.

STUDENT SELF-CHECK

COMPACTING A CULTIVATED AREA OF SOIL WITH A LAWN ROLLER

DO NOT WRITE ON THIS SHEET
Answer the following:

1. What is the purpose of compacting soil with a roller?

2. Rolling is a good way to level or fill in low spots in the lawn.

   True_____ False_____

3. Rolling should be done very early in the spring.

   True_____ False_____

4. A common error in rolling is
   (a) rolling when soil is too wet
   (b) rolling with too heavy a roller
   (c) both

5. When rolling, never let the roller overlap where it traveled the previous trip.

   True____ False_____

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Your instructor has marked off a cultivated area of soil. Compact the soil, using a lawn roller.

CORRECT RESPONSES

1. To press the crowns of the turf against the soil to keep them from drying out.
2. False. Just the opposite, depressions become greater as the roller is used.
3. True. Rolling is of most benefit before all freezing and thawing has stopped.
4. (c) Both, rolling when soil is too wet and rolling with too heavy a roller.
5. False. Always overlap at least 12 inches.

DO NOT WRITE ON THIS SHEET

LAP 60

Student ______________________

Date ______________________

COMPACTING A CULTIVATED AREA OF SOIL WITH LAWN ROLLERS

Instructor's Final Checklist

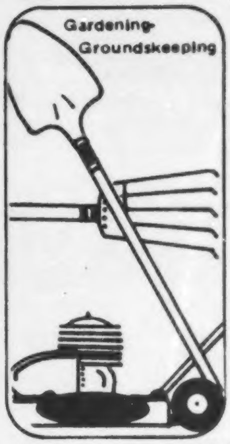
Check the student's performance in the following elements of compacting a cultivated area of soil with lawn rollers.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Filled roller to correct level with water.	☐	☐	☐	☐
2.	Overlapped the roller by at least 12" (30.48 cm).	☐	☐	☐	☐
3.	Checked soil moisture to determine if it was correct for compacting.	☐	☐	☐	☐
4.	Compacted soil traveling in one direction, then compacted again in a crosswise direction.	☐	☐	☐	☐

Learning Activity Package No. 61



Operating Equipment

APPLYING A CHEMICAL WITH A HAND SPRAYER

Objective No. 113

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping work is to apply a chemical with a hand sprayer. In order to adequately control pests, chemicals must be applied so that good coverage and proper safety is insured. In this learning activity package you will learn how to properly apply a chemical with a hand sprayer.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a liquid pesticide and hand sprayer, spray an area which has insect-infested plants. The amount of chemical applied should be within ± 5 percent of the amount recommended by the state experiment station. Recommended mixtures should be used, all safety rules observed, and uniform coverage should be evident.

LEARNING ACTIVITIES

1 READ *Applying Pesticides*, p. 63, "Operating Sprayers," and p. 83, "Operating the Sprayer," Colvin and Turner, AAVIM publication.

or ______________________________

READ the Instructions, APPLYING A CHEMICAL WITH A HAND SPRAYER.

or ______________________________

2 CHECK YOUR KNOWLEDGE of applying a chemical with a hand sprayer by taking the Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 PRACTICE performing the task of applying a chemical with a hand sprayer.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY

1. Wear protective clothing and gloves if recommended by manufacturer.
2. Wear face mask if recommended by manufacturer.

3. Be sure any containers in the area are properly covered if they contain any water or food.

4. Be sure not to spill any of the chemical from its container.

EQUIPMENT

1. Pressure hand sprayer with tank pump
2. Gloves (if recommended by manufacturer)
3. Face mask (if recommended by manufacturer)

MATERIALS NEEDED

1. Chemical to be used
2. Device such as spoon, to measure chemical
3. Water

INSTRUCTIONS

APPLYING A CHEMICAL WITH A HAND SPRAYER

(1) Remove or cover water containers and food sources in area.

(2) Read chemical labels completely.

(3) Observe all safety precautions for pesticide.

(4) Partially fill sprayer with water.

(5) Determine amount of pesticide needed.

(6) Add pesticide to sprayer.

(7) Add water until sprayer is filled.

(8) Thoroughly mix solution.

(9) Put on protective mask, if necessary.

(10) Pressurize sprayer with tank pump.

(11) Determine starting point and adjust nozzle for desired coverage.

(12) Spray affected area in a uniform pattern.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

APPLYING A CHEMICAL WITH A HAND SPRAYER

Answer the following.

1. Name 3 types of hand applicators for applying a chemical.

2. The aerosol sprayer is best to use for spraying lawns and shrubs.

   True ___ False ___

3. How do we determine what safety precautions to observe when using a chemical?

4. Hand sprayers are not suitable for the vegetable garden and shrubs and lawns.

   True ___ False ___

5. Compressed air hand sprayers have a pump inside the tank.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, APPLYING A CHEMICAL WITH A HAND SPRAYER.

Spray insect-infested plants identified by your instructor, using a hand sprayer.

CORRECT RESPONSES

1. Compressed air, trigger-pump, hand pump, aerosol, bucket and garden hose
2. False. This type would be too expensive for these uses.
3. Read the label on the container. The manufacturer will give complete instructions.
4. False. They are probably one of the most suitable.
5. True

DO NOT WRITE ON THIS SHEET

LAP 61

Student ____________________

Date ____________________

APPLYING A CHEMICAL WITH A HAND SPRAYER

Instructor's Final Checklist

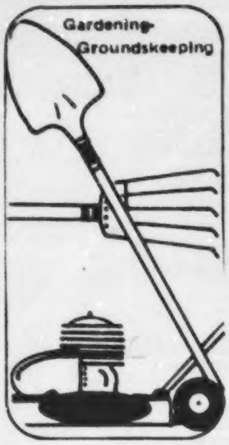
Check the student's performance in the following elements of applying a chemical with a hand sprayer.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Removed food and water containers before mixing chemical.	☐	☐	☐	☐
2. Read label instructions completely before beginning to work with the chemical.	☐	☐	☐	☐
3. Observed all safety precautions for the chemical being used.	☐	☐	☐	☐
4. Partially filled sprayer tank with water.	☐	☐	☐	☐
5. Added chemical to tank and finished filling tank with water.	☐	☐	☐	☐
6. Mixed thoroughly chemical with water.	☐	☐	☐	☐
7. Pressurized tank with hand pump.	☐	☐	☐	☐
8. Adjusted nozzle for proper coverage.	☐	☐	☐	☐
9. Sprayed infected area in a uniform pattern.	☐	☐	☐	☐

Learning Activity Package No. 62



Operating Equipment

DRIVING A TRACTOR

Objective No. 118

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is driving a tractor.

Driving a tractor may seem simple but there are several responsibilities to carry out as well as some safety precautions to observe.

In this learning activity package you will learn to drive a tractor, what things must be checked before and during operation of the tractor, as well as safety procedures necessary to operate the tractor.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a tractor, an operator's manual, and a driving area with hills and obstacles, drive the tractor through the area, observing all safety rules and regulations. Performance will be judged by the instructor, using a checklist. All items must be checked yes for satisfactory performance.

LEARNING ACTIVITIES

1 READ *Tractor Operation and Daily Care* pp. 80-102, "Doing the Routine Operational Jobs and Operating a Tractor Under Highway Conditions." Southern Association of Agricultural Engineering and Vocational Agriculture, June, 1959.

or ______________________________

2 READ the instructions.

3 CHECK YOUR KNOWLEDGE of driving a tractor by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of driving a tractor.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Observe all safety precautions given in references.

EQUIPMENT NEEDED

1. Tractor
2. Operator's manual
3. Driving area or range

MATERIALS NEEDED

Fuel

INSTRUCTIONS

DRIVING A TRACTOR

(1) Check seat position and adjust if needed.

(2) If tractor is stored in building, check for adequate ventilation before starting engine.

(3) Check fuel level.

(4) Open fuel supply or lines.

(5) Place transmission in proper setting for starting engine.

(6) Set speed control lever.

(7) Disengage clutch, if applicable.

(8) Set choke.

(9) Turn ignition switch to "on" position, if applicable.

(10) Start engine.

(11) Drive tractor through area.

STUDENT SELF-CHECK

DRIVING A TRACTOR

DO NOT WRITE ON THIS SHEET
Answer the following:

1. If power take-off is not to be used when operating tractor, it should be disengaged. True False
2. Tractor should not be in gear when starting. True False
3. When starting a tractor engine inside a building, be sure there is plenty of (room, ventilation, fuel). (Circle the correct word).
4. When pulling a load up a steep hill, extra weight should be put (on front end of a tractor, on the rear wheels, in the middle of the tractor). (Circle the correct words).
5. When going down a hill, the tractor should be taken out of gear. True False

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Drive a tractor through the area designated by your instructor.

CORRECT RESPONSES

1. True
2. True. If tractor is in gear, it might possibly begin moving if foot should slip off clutch pedal.
3. Ventilation, if there is not plenty of ventilation, operator could be overcome with carbon monoxide.
4. On the front end of the tractor to prevent front wheels from coming off the ground.
5. False. Leave tractor in gear to help with braking.

DO NOT WRITE ON THIS SHEET

LAP 62

Student ____________________

Date ____________________

DRIVING A TRACTOR

Instructor's Final Checklist

Check the student's performance in the following elements of driving a tractor.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Checked seat position before tractor was started.	☐	☐	☐	☐
2.	Checked for proper ventilation before tractor was started inside building.	☐	☐	☐	☐
3.	Checked fuel level in tank before starting tractor engine.	☐	☐	☐	☐
4.	Placed transmission in neutral before tractor was started.	☐	☐	☐	☐
5.	Set choke before tractor was started.	☐	☐	☐	☐
6.	Drove tractor through area in proper gear and at proper speed.	☐	☐	☐	☐

Learning Activity Package No.63

Gardening-
Groundskeeping

Operating Equipment

DRIVING A PICKUP TRUCK

Objective No. 114

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping work is to drive a pickup truck.

Pickup trucks are very useful machines in gardening and groundskeeping work. Learning to drive one safely and properly is a necessity in this kind of work. In this learning activity package you will learn to operate a pickup truck safely and properly.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a pickup truck and an area for maneuvering the vehicle, drive the vehicle through the area making all turns and signals safely and correctly. All traffic rules, regulations, and laws must be obeyed.

LEARNING ACTIVITIES

1 READ current issue of *South Carolina Drivers Handbook,* Section on Safe Driving.

and ______________________________

The *Owner's Handbook* for the truck you are going to drive.

or ______________________________

2 READ the Instructions, DRIVING A PICKUP TRUCK.

or ______________________________

3 CHECK YOUR KNOWLEDGE of driving a pickup truck by taking the Student Self-Check.

4 PRACTICE performing the task of driving a pickup truck.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Be sure you have studied safe operation of a pickup truck and that you observe these precautions as you go through the instructions.

EQUIPMENT NEEDED

Pickup truck

MATERIALS NEEDED

None

INSTRUCTIONS

DRIVING A PICKUP TRUCK

(1) Check the seat and adjust to a comfortable position.

(2) Fasten seat belts and/or harness.

(3) Check lights, horn, windshield wipers and brakes for proper operation.

(4) Select neutral gear and start engine.

(5) Select power gear and gently accelerate.

(6) Maneuver vehicle through area using proper gears, speeds, and brakes.

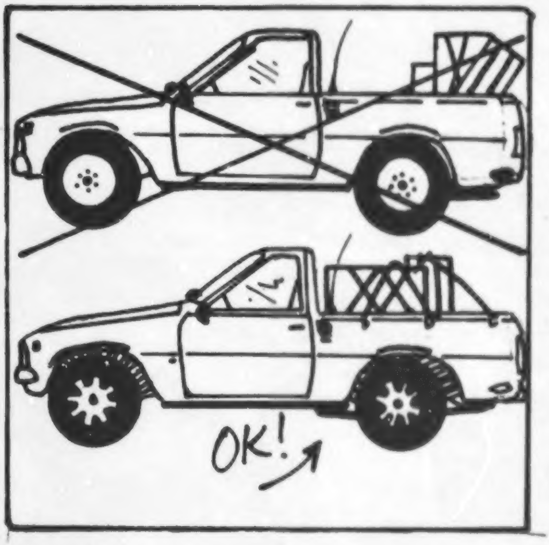


Figure 1. The major difference in driving a car and pickup truck is in the loading. Make sure the load is centered toward the front and secured.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

DRIVING A PICKUP TRUCK

Answer the following.

1. The most important thing about driving a pickup truck is ________________

2. Seat belts are not as important in pickup trucks as they are in automobiles.

   True ___ False ___

3. Tire pressure should be checked periodically on pickup trucks.

   True ___ False ___

4. Brakes are a very important safety item on a pickup truck.

   True ___ False ___

5. Engine oil should be checked each time the truck is fueled.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, DRIVING A PICKUP TRUCK.

Correctly drive a pickup truck through the area designated by your instructor.

CORRECT RESPONSES

1. Operating the truck in a safe manner.
2. False. Pickup trucks are operated on highways more than some automobiles.
3. True. Adequate tire pressure insures longer life tires.
4. True
5. True. Oil level in an engine should always be at or near full.

DO NOT WRITE ON THIS SHEET

LAP 63

Student ____________________

Date ____________________

DRIVING A PICKUP TRUCK

Instructor's Final Checklist

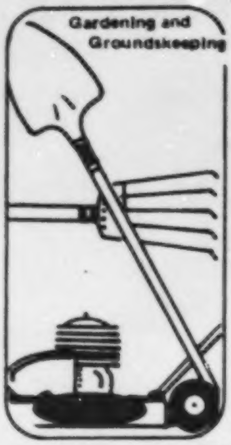
Check the student's performance in the following elements of driving a pickup truck.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Adjusted seat to a comfortable position.	[ ]	[ ]	[ ]	[ ]
2. Fastened seat belts and/or harnass before starting engine.	[ ]	[ ]	[ ]	[ ]
3. Checked lights, horn, windshield wipers, and brakes for proper operation.	[ ]	[ ]	[ ]	[ ]
4. Selected neutral gear before starting engine.	[ ]	[ ]	[ ]	[ ]
5. Selected proper gear and accelerated engine gently.	[ ]	[ ]	[ ]	[ ]
6. Maneuvered vehicle through driving range, using proper gears, speeds and brakes.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 64



Operating Equipment

LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER

Objective No. 109

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping work is to load topsoil on a truck with a front-end loader.

In order to do a satisfactory job of loading topsoil you must know some basic rules of operating a tractor as well as the front-end loader. In this learning activity package you will learn how to satisfactorily load topsoil on a truck, using a tractor with a front-end loader.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a front-end loader and operator's manual, load approximately 2 cubic yards (1.5 cubic m) of topsoil onto the rear of a truck. Loading should be done according to recommended safety practices without damaging the loader or truck.

LEARNING ACTIVITIES

1 READ *Owner's Manual* for the tractor and loader you are going to use to load the topsoil.

or ______________________________

2 READ OPERATING THE FRONT-END LOADER – GENERAL.

or ______________________________

3 READ the Instructions, LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER.

or ______________________________

4 CHECK YOUR KNOWLEDGE of loading topsoil on a truck with a front-end loader by taking the Student Self-Check.

5 **OBSERVE** another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 **PRACTICE** performing the task of loading topsoil with a front-end loader.

7 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY*

Most farm equipment accidents can be avoided by following simple safety precautions. These safety precautions, if followed at all times, will help you operate your loader safely.

1. Do not attempt to start the engine while standing beside the tractor. Always start the engine while sitting in the tractor seat.
2. Always shut off the engine when leaving the tractor.
3. Do not leave the tractor-loader when it is in motion.
4. Do not allow anyone but the operator to ride on the tractor-loader.
5. Do not make mechanical adjustments while the unit is in motion, the bucket is raised, or the engine is running.
6. Do not tow the tractor faster than 20 mph.
7. Do not attempt to repair or tighten hydraulic hoses when under pressure, when the tractor engine is running the lift arms are raised.
8. Do not dismount from the tractor and leave the loader lift arms raised.
9. Do not get under the bucket or lift arms or reach through the lift arms when the loader is raised.
10. When parking, make sure the parking brakes are set and the bucket is fully lowered.
11. Place adequate counterweight on the rear of the tractor and move wheels to recommended settings for optimum stability.
12. Exercise extreme caution when operating the tractor with a raised, loaded bucket or fork.

*Courtesy of Ford Tractor Operations – Ford Motor Company

EQUIPMENT NEEDED

Tractor with front-end loader
Truck to load topsoil onto

MATERIALS NEEDED

Topsoil

OPERATING THE FRONT-END LOADER – GENERAL*

CONTROLS

The loader, when operated by the tractor hydraulic system, is controlled by the two tractor remote control valve levers, shown in Figure 1. Moving the remote control levers forward will lower and dump the bucket; moving the levers rearward will raise and roll back the bucket. A float position is obtained by moving the lift lever full forward to permit the loader to "float", or follow the ground contour. The lift lever locks in the float position and must be manually moved to another position. The levers can be "feathered" (moved slightly) in all positions except float, to give precise loader control.

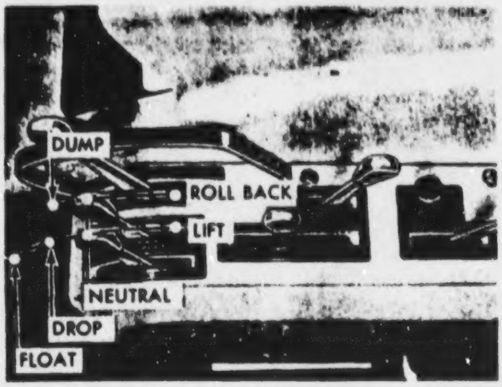


Figure 1
Remote Control Valve Levers

**Courtesy of Ford Tractor Operations–Ford Motor Company.*

The loader, when operated by an external hydraulic system, is controlled by 2-spool valve mounted on the loader frame, as shown in Figure 2. The control levers on the valve operate the loader in the same manner as the tractor remote control levers.

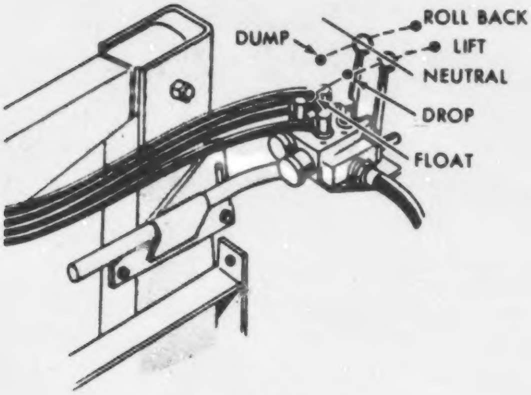


Figure 2
2-Spool Control Valve

PRE-OPERATION

For optimum load and weight distribution set the tractor front wheels at a 56" spacing. Refer to your tractor operators manual for front wheel spacing procedure.

Before operating the loader add counterbalance weight of at least 2500 pounds to the tractor with rear wheel weights and/or liquid ballast. If more counterbalance weight is desired, refer to your tractor operator's manual for weighting limitations.

The effective counterbalance weight of mounted rear equipment is determined by multiplying the actual weight of equipment by 1.50. Example: Equipment weighing 800 pounds attached to the rear of the tractor multiplied by 1.50 equals 1200 pounds of effective counterbalance weight.

OPERATION

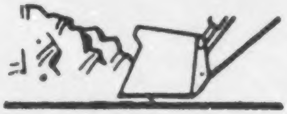
The loader should be operated with the tractor engine running at 1200-1700 rpm. Excessive speeds are dangerous and may cause bucket spillage and unnecessary strain on the tractor and loader.

When operating in temperatures below 30 degrees F., run the tractor engine below 1200 rpm until the oil temperature exceeds 30 degrees F.

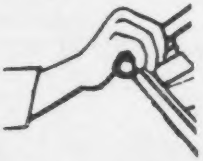
The following illustrations offer suggested operating techniques for your consideration.

Filling The Bucket

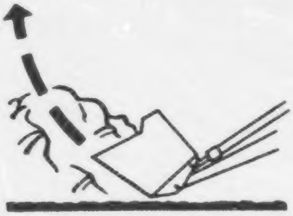
Approach and enter the pile with a level bucket.



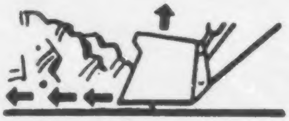
Ease both levers back to lift and roll back the bucket.



The lift and rollback of the bucket will increase efficiency because............



a level bucket throughout the lifting cycle resists bucket lift or breakaway.



NOTE: If the bucket is not completely filled, do not waste time by trying to load some more material in the bucket. Maximum productivity is determined by the amount of material loaded in a given period of time. Time is lost if two or more attempts are made to fill the bucket on each pass.

Carrying The Load

Position the bucket just below the level of the tractor hood, for maximum stability and visibility, whether the bucket is loaded or empty.

**Courtesy of Ford Tractor Operations–Ford Motor Company.*

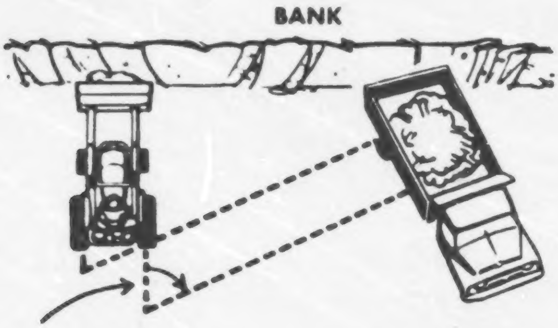
Loading From A Bank

Choose a forward gear that provides sufficient ground speed for loading.

For faster loading, maintain a 45 degrees turn angle, and work as close to the truck as possible.

Keep the surface from the bank to the truck free of ruts and holes.

Backgrade with the bucket occasionally, and approach and bank with the bucket flat. Slight down pressure with the bucket level helps keep the working area smooth. Use the heel or lower rear edge of the bucket for backgrading ruts, etc.

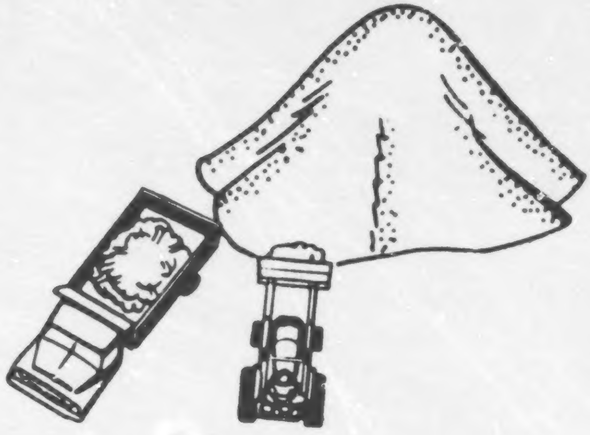


Always keep the truck close to the operation and keep the cutting depth about half the length of the truck bed.

Loading From A Stockpile

Initially approach the stockpile with the bucket approximately two feet off of the ground. The bucket may be operated at a lower position when the stockpile height has been reduced so the bucket will break out easily at ground level.

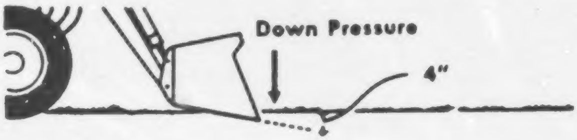
Keep an area clean for the truck to back into, as close to the work area as needed. This will minimize the travel distance from the pile to the truck.



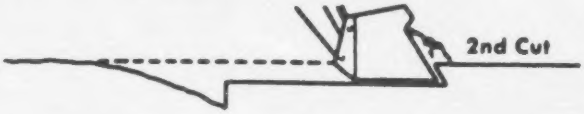
Keep the truck in close and work around the pile.

Peeling And Scraping

Use down pressure and a slight bucket angle to start long cuts. Make a short angle cut and break out cleanly.



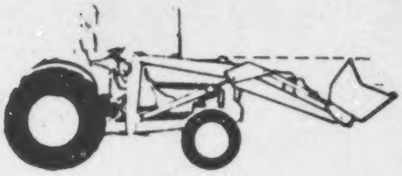
During peeling operations, use lift cylinder down pressure and a slight bucket angle to penetrate to the desired working depth. After reaching the desired working depth, use only the bucket lever, leaving the lift lever in either the float or neutral position. This allows the operator to concentrate on controlling the bucket angle to maintain a precise cut.



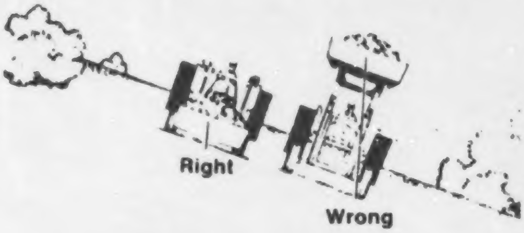
With the bucket level, start a cut at the notch approximately two inches deep. Hold the depth by feathering the bucket lever to adjust the cutting lip up or down. When the front tires enter the notch, adjust the lift and bucket lever to maintain proper depth.

Make additional cuts until the desired depth is reached.

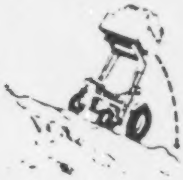
**Courtesy of Ford Tractor Operations–Ford Motor Company .*

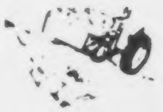


When operating the loader on a hill or slope, keep the bucket as low as possible. This keeps the bucket center of gravity as low as possible. This will give you maximum tractor stability.



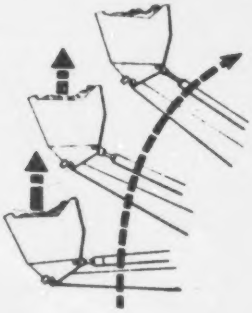
When transporting the load, keep the bucket as low as possible to avoid tipping over, in case a wheel drops in a rut.





Lifting The Load

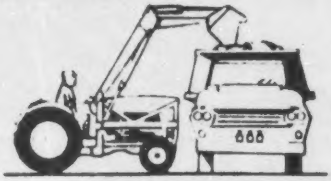
When lifting the load, keep the bucket positioned so as to avoid spillage.



NOTE: Do not attempt to lift bucket loads in excess of the loader capacity.

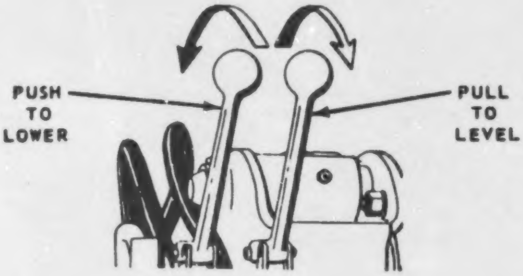
Dumping The Bucket

Lift the bucket high enough to clear the side of the vehicle. Move the tractor in as close to the side of the vehicle as possible, then dump the bucket.



Lowering The Bucket

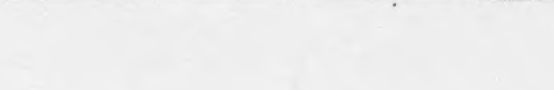
After the bucket is dumped, back away from the vehicle while lowering and leveling the bucket.



Operating With Float Control

During hard surface operation, keep the bucket level and put the lift lever in the float position to permit the bucket to float on the working surface. If hydraulic down pressure is exerted on the bucket it will wear faster than normal.

The float position will also prevent the mixing of surface material with stockpile material. The float position will reduce the chance of surface gouging when removing snow or other material, or when working with a blade or broom.



**Courtesy of Ford Tractor Operations–Ford Motor Company.*

If the lift lever is used without controlling the bucket angle, the bucket will gouge and leave a series of ruts in the surface.

*Courtesy of Ford Tractor Operations – Ford Motor Company.

INSTRUCTIONS

LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER

(1) Review owner's manual for operation of front-end loader before instructor demonstration.

(2) Practice operating front-end loader in open area.

(3) Move front-end loader to work area.

(4) Using bucket of front-end loader and auxiliary equipment, begin moving soil from pile to truck.

(5) Remove additional soil until specified amount is on truck.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER

Answer the following.

1. What is the best source of information on the operation of a front-end loader?

2. Why should a beginner operator practice in an open area?

3. The operator should be familiar with the following controls before beginning to operate a front-end loader. (Gears, throttle, clutch, hydraulic controls)

    a. all of the above
    b. one of the above
    c. none of the above

4. When should engine oil be checked in tractor engine?

5. List five control positions used on a front-end loader.

6. Counter balance should be added to the rear wheels or other equipment attached to the rear of the tractor before operating the front-end loader.

    True False

7. When transporting a load from one point to another, the bucket should:

    a. be kept in the above tractor position
    b. be kept at the lowest level feasible

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER.

With a front-end loader, load 2 cubic yards of topsoil onto a truck provided by your instructor.

CORRECT RESPONSES

1. Your Owner's Manual.
2. To prevent the tractor from tipping over and to prevent damage to loader.
3. a. all of the above
4. Each time tractor is fueled.
5. a. dump, b. roll back, c. Lift, d. drop, e. float
6. True
7. b.

DO NOT WRITE ON THIS SHEET

LAP 64

Student ______________________

Date ______________________

LOADING TOPSOIL ON TRUCK WITH FRONT-END LOADER

Instructor's Final Checklist

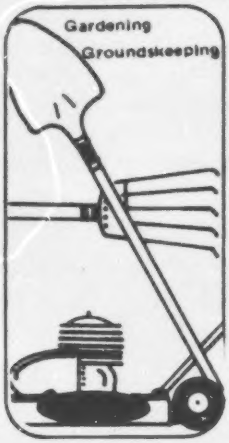
Check the student's performance in the following elements of loading topsoil on truck with front-end loader.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Reviewed Owner's Manual before instructor demonstration.	☐	☐	☐	☐
2. Practiced operating loader in an open area.	☐	☐	☐	☐
3. Moved tractor with loader to work area.	☐	☐	☐	☐
4. Loaded specified amount of soil onto truck without damage to truck or loader.	☐	☐	☐	☐

Learning Activity Package No. 65



Operating Equipment

CALIBRATING TRACTOR-MOUNTED SPRAYER

Objective No. 108

Ornamental Horticulture

INTRODUCTION

One of the jobs a groundskeeper must perform when doing groundskeeping work is to calibrate a tractor mounted sprayer.

In order to apply the correct amount of pesticide with a tractor mounted sprayer, the sprayer must be properly calibrated.

In this learning activity package you will learn to check the amount of pesticide the sprayer is applying and set the calibration so that the correct amount of pesticide is being applied.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a tractor-mounted sprayer, owner's manual, auxiliary equipment, and necessary chemicals, calibrate the sprayer to apply the chemical within ± 1 percent of the recommendations set by the state experiment station for curly leaf dock.

LEARNING ACTIVITIES

1 READ *Applying Pesticides,* American Association for Vocational Instructional Materials, 1976 – Read Section 2, "Calibrating the Sprayer", pp. 73-79.

or ______________________________

2 READ the Instructions.

3 CHECK YOUR KNOWLEDGE of calibrating a tractor mounted sprayer by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of calibrating a tractor mounted sprayer.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Be certain that all safety equipment listed under EQUIPMENT NEEDED is used properly.

EQUIPMENT NEEDED

1. Tractor with sprayer mounted

2. Manufacturer's manual for sprayer

3. Gloves
4. Goggles
5. Respirator
6. Protective Clothing

MATERIALS NEEDED

1. Containers for catching water from nozzles
2. Chemical with label
3. Water

INSTRUCTIONS

CALIBRATING TRACTOR MOUNTED SPRAYER

(1) Fill sprayer with water.

(2) Select a constant tractor speed and pump pressure suited to nozzles and terrain.

(3) Select appropriate nozzle.

(4) Measure and mark a specific distance of travel.

(5) With tractor running at selected constant speed, measure the time needed to travel the selected distance.

(6) With pump running at selected constant pressure, collect spray for the time needed to travel the measured distance. (Collect from 2 or more nozzles, measure amount collected and determine the average amount delivered by each nozzle).

(7) Determine amount of material sprayed. (Average amount per nozzle x number of nozzles. Convert to gallons.)

(8) Calculate area sprayed in acres (Boom width x distance traveled divided by 43,560 ft.^{2}/A.)

(9) Calculate amount of material sprayed on one acre (amount sprayed on calibration plot divided by number of acres in calibration plot).

(10) Determine amount of chemical needed to spray one acre. (See chemical label or consult state recommendations.)

(11) Determine amount of material to be added to one tank of water.

$$\frac{\text{Tank volume}}{\text{Amt. applied/acre}} \text{ x active amount to be applied/A}$$

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

CALIBRATING TRACTOR-MOUNTED SPRAYER

Answer the following:

1. Protective clothing and equipment should be used even though only water is used in the tank for calibration. True False
2. Why is selecting appropriate nozzle important?
3. A constant tractor speed and pump pressure must be maintained. True False
4. When collecting the spray, it should be collected from ________ or more nozzles.
5. How is area in acres sprayed determined?
6. How do we determine the amount of chemical needed to spray one acre?

CORRECT RESPONSES

1. True. Even though water is used, there might be some pesticide residue left in the tank.
2. To insure the proper spray coverage on the ground.
3. True. Otherwise too much or too little chemical is applied.
4. Two
5. Boom width x distance traveled/43,560 sq. ft.
6. From the label on the chemical or recommendations from agricultural experiment station

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Calibrate a tractor-mounted herbicide sprayer for application of a chemical to curly leaf dock.

DO NOT WRITE ON THIS SHEET

LAP 65

Student ______________________

Date ______________________

CALIBRATING TRACTOR-MOUNTED SPRAYER

Instructor's Final Checklist

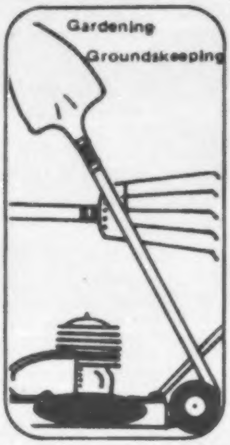
Check the student's performance in the following elements of calibrating tractor-mounted sprayer.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Selected a constant tractor speed suitable to terrain and nozzles.	[ ]	[ ]	[ ]	[ ]
2. Selected appropriate spray nozzle.	[ ]	[ ]	[ ]	[ ]
3. Collected amount of spray from two nozzles, and measured to determine average amount of spray delivered by each nozzle.	[ ]	[ ]	[ ]	[ ]
4. Determined amount of material that was sprayed.	[ ]	[ ]	[ ]	[ ]
5. Calculated amount of material sprayed on one acre.	[ ]	[ ]	[ ]	[ ]
6. Determined amount of chemical needed to spray one acre.	[ ]	[ ]	[ ]	[ ]
7. Determined amount of material needed to be added to one tank of water.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 66



Operating Equipment

APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER

Objective No. 112

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing groundskeeping is to apply a chemical with a tractor-mounted sprayer.

In order to apply the chemical properly and obtain effective pest control, adequate and even coverage must be obtained by using a constant tractor speed with the sprayer discharging the proper amount of spray material. In this learning activity package you will learn how to properly apply a chemical with a tractor-mounted sprayer.

DIRECTIONS

Before you begin to work on this learning activity package, be sure you have completed the learning activity package no. 65.

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a tractor-mounted sprayer and a chemical, apply the chemical to a lawn infested with grasshoppers. The amount of chemical applied should be within ± 5 percent of the amount recommended for the lawn size and insect infestation.

LEARNING ACTIVITIES

1 READ *Applying Pesticides*, Amer. Assn. for Vocational Instructional Materials, 1976, by Colvin and Turner, Athens, Georgia, pp. 82-83.

or ______________________________

2 READ the Instructions, APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER.

or ______________________________

3 CHECK YOUR KNOWLEDGE of applying a chemical with a tractor-mounted sprayer by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 **PRACTICE** performing the task of applying a chemical with a tractor-mounted sprayer.

6 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY *

1. Wear protective clothing and equipment recommended for the pesticide being applied.
2. Do not allow riders on tractor or sprayer.
3. Do not allow children, pets or livestock in the area to be sprayed, during or soon after the operation.
4. Be sure sprayer is shut off when moving from one field to another.
5. Turn sprayer off when turning around at row ends. Do not restart until spraying position is reached.
6. If spray tanks are mounted on sides of tractor, be extra careful on slopes and uneven ground.
7. Do not spray near property of others on windy days.

***Items 1–7 taken from *The Ball Red Book*, page 112.**

EQUIPMENT NEEDED

1. Tractor
2. Tractor-mounted sprayer

MATERIALS NEEDED

1. Pesticide material (chemical)
2. Water, for properly mixing with chemical

INSTRUCTIONS

APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER

(1) Remove or cover water containers and food sources in area.

(2) Read chemical labels completely.

(3) Partially fill sprayer with water.

(4) Determine amount of chemical needed for area and amount of application.

(5) Add chemical to sprayer, carefully following label directions.

(6) Add surfactant, if applicable.

(7) Add water until sprayer is full.

(8) Thoroughly mix solution.

(9) Determine starting point and direction of travel.

(10) Put on protective mask, if applicable.

(11) Start movement of tractor and open nozzle(s).

(12) Maintain constant ground speed until area is covered.

(13) Observe all safety precautions in handling and applying chemical.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER

Answer the following.

1. Preparing the sprayer for operation is a very important part of the spraying operation.

   True ___ False ___

2. Full coverage of leaves and stems is important for disease and insect control.

   True ___ False ___

3. Why is it necessary to make adjustments to the sprayer during the growing season?

4. Most pesticides do not require safety precautions when applying them.

   True ___ False ___

5. There is less chance of a rear-mounted sprayer tank causing a tractor to tip over than side-mounted tanks.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER.

Spray a lawn infested with grasshoppers, using a tractor-mounted sprayer.

CORRECT RESPONSES

1. True. Calibration and proper mixing of spray material are most important.
2. True
3. Adjustments will be needed because the plants get larger during the growing season.
4. False. Always read the label to see what safety precautions are recommended, and follow them exactly.
5. True

DO NOT WRITE ON THIS SHEET

LAP 66

Student ____________________

Date ____________________

APPLYING A CHEMICAL WITH A TRACTOR-MOUNTED SPRAYER

Instructor's Final Checklist

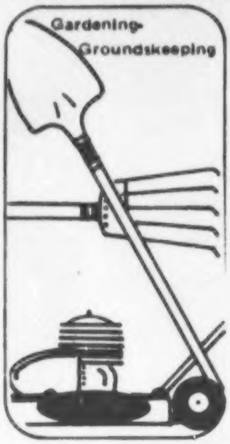
Check the student's performance in the following elements of applying a chemical with a tractor-mounted sprayer.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Removed water and food materials from area before beginning to work with pesticide.	[ ]	[ ]	[ ]	[ ]
2. Read pesticide label completely.	[ ]	[ ]	[ ]	[ ]
3. Determined amount of chemical needed for the area to be sprayed.	[ ]	[ ]	[ ]	[ ]
4. Thoroughly mixed the spray solution.	[ ]	[ ]	[ ]	[ ]
5. Started movement of tractor and opened spray nozzles.	[ ]	[ ]	[ ]	[ ]
6. Maintained a constant ground speed until area was covered.	[ ]	[ ]	[ ]	[ ]
7. Observed all necessary safety precautions during the operation.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 67



Maintaining Equipment

REPLACING HANDLES FOR TOOLS

Objective No. 136

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper will perform when doing groundswork is replacing handles for tools. Tool handles must be kept in good condition if they are to do the work intended. Also, cracked or broken handles, or poorly fitting handles, are safety hazards to the user of handtools. In this learning activity package you will learn to replace handles in handtools and to refit the tool if needed.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given access to repair tools and supplies, replace a broken handle on a handtool. The handle and tool must correspond in terms of size and appearance. The handle must not work loose during practice use.

LEARNING ACTIVITIES

1 READ *Mechanics in Agriculture*, pp. 140-152, 1967 ed.; pp. 142-154, 1977 ed.

or ______________________________

2 READ the Instructions.

3 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4 CHECK YOUR KNOWLEDGE of replacing handles in tools by taking the Student Self-Check.

5 PRACTICE performing the task of replacing a broken handle. Follow the procedure outlined in learning activity 2.

6 ARRANGE with your instructor to complete this package by going through the Check-Out Activity.

SAFETY

Be sure you have been checked out on the use of the ripsaw before attempting to cut wedge.

EQUIPMENT NEEDED

1. Metal vise
2. Hacksaw
3. Drill and twist drill bits
4. Punch
5. Cold chisel
6. Hammer
7. Wood rasp
8. Half-round wood file
9. Mallet
10. Ripsaw

MATERIALS NEEDED

1. New handle
2. Soft wood for making wedge
3. Boiled linseed oil

INSTRUCTIONS

REPLACING HANDLES FOR TOOLS

(1) Secure tool in vise.

(2) Remove old handle.

(3) Re-condition tool, if applicable.

(4) Fit new handle to tool.

(5) Place handle in tool for trial fit.

(6) Remove handle and finish fitting.

(7) Place new handle in tool. Use soft wooden wedge to insure tight fit.

(8) Treat handle with boiled linseed oil.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

REPLACING HANDLES FOR TOOLS

Answer the following:

1. The first job to do when replacing handles for tools is to treat the new handle with boiled linseed oil.

   True ___ False ___

2. The vise jaws, used to hold the tool, should be covered with __________ or __________ .

3. What material can be put on the new handle when it is being shaped, to show where the high points are? __________ or __________ .

4. What operation should be done to the tool, if needed, before the new handle is fitted?

5. Why should boiled linseed oil be used instead of raw linseed, to treat the new handle?

6. Soft pine wood should be used to make the wedge for the new handle.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, REPLACING HANDLES FOR TOOLS.

Replace a broken handle on a handtool identified by your instructor.

CORRECT RESPONSES

1. False. That is the last operation.
2. Sheet metal or wood blocks
3. Starch or chalk
4. Recondition the tool
5. Boiled linseed oil is sticky while raw linseed oil acts as a lubricant and may cause the handle or wedge to loosen.
6. True

DO NOT WRITE ON THIS SHEET

LAP 67

Student ______________________________

Date ______________________________

REPLACING HANDLES FOR TOOLS

Instructor's Final Checklist

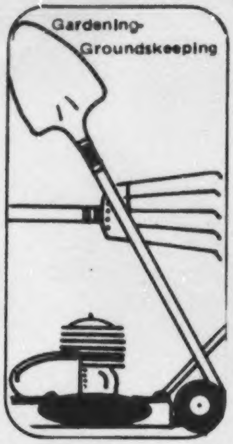
Check the student's performance in the following elements of replacing handles for tools.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Assembled tools and supplies before beginning task of fitting new handle.	[ ]	[ ]	[ ]	[ ]
2. Covered vise jaws to hold the tool with sheet metal or wood blocks.	[ ]	[ ]	[ ]	[ ]
3. Reconditioned tool for new handle.	[ ]	[ ]	[ ]	[ ]
4. Fitted handle properly into tool.	[ ]	[ ]	[ ]	[ ]
5. Used wedge to tighten handle into tool.	[ ]	[ ]	[ ]	[ ]
6. Fitted the part of the new handle into the tool and treated handle with boiled linseed oil.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 68



Maintaining Equipment

REPAIRING EXTENSION CORDS

Objective No. 137

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is to repair extension cords.

Extension cords and their plugs must be kept in good condition if they are to give good electrical service and be safe to the user and help keep buildings safe from fire.

In this learning activity package you will learn how to properly repair an extension cord or replace a defective plug.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then arrange with your instructor to do the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a damaged extension cord and access to repair tools and parts, repair a damaged male or female socket on an extension cord. All exposed wires on the end of the cord should be wrapped with tape to within 1/2" (1.27 cm) of the connection points to avoid short circuits. Contact connections must be tight.

LEARNING ACTIVITIES

1 READ *Maintaining the Home Lighting and Wiring System,* American Association for Agricultural Engineering and Vocational Agriculture, Section I, Replacing an attachment Plug, pp. 2-6.

or ______________________________

2 READ the instructions.

3 CHECK YOUR KNOWLEDGE of repairing extension cords by taking Student Self-Check.

or ______________________________

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of repairing an extension cord.

6 ARRANGE with your instructor to complete this module by going through the Check-Out Activities.

SAFETY

1. Be sure extension cord is disconnected from any electrical source.
2. Be careful in use of knife.

TOOLS AND EQUIPMENT NEEDED

1. Screwdriver, correct size
2. Wire cutting pliers
3. Pocket knife
4. Scissors

MATERIALS NEEDED

1. Sewing thread, about 12" (30.48 cm)
2. New attachment plug

INSTRUCTIONS

REPAIRING EXTENSION CORDS

(1) Remove old socket.

(2) If possible, trim end of cord.

(3) Run cord through socket, if applicable.

(4) Remove outer insulation.

(5) Tie holding knot in cord, if possible.

(6) Remove enough insulation from each wire to hook around terminal screws.

(7) Place wire around terminal screw and tighten. Follow color code and ground proper terminals on male and female sockets.

(8) Secure sides or ends of socket with screw, if applicable.

STUDENT SELF-CHECK

REPAIRING EXTENSION CORDS

DO NOT WRITE ON THIS SHEET

Answer the Following:

1. When preparing cord for a standard plug, remove about_____ inches of the outer jacket (insulation).

2. When removing insulation from stranded wires, with a knife, hold the blade until it slopes almost parallel with wire.

   True_____False_____

3. After insulation has been removed from stranded wire, wires should be scraped until bright, why?

4. Each wire should go around the metal prong of the plug before it is fastened to the connecting screw.

   True_____False_____

5. Be sure there are no fine wires projecting out from the screw terminal when the screw is tightened.

   True_____False_____

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, REPAIRING EXTENSION CORDS.

Repair a damaged male or female socket on an extension cord identified by your instructor.

CORRECT RESPONSES

1. Three inches (7.6 cm)
2. True. If the blade is not sloped enough it may cut some of the small strands of wire.
3. The wires may then make good electrical contact.
4. True. When this is done there is less chance of the wire coming loose from the terminal screw when disconnecting the plug from the receptacle.
5. True. Any loose wires may cause a short.

DO NOT WRITE ON THIS SHEET

LAP 68

Student ______________________

Date ______________________

REPAIRING EXTENSION CORDS

Instructor's Final Checklist

Check the student's performance in the following elements of repairing extension cords.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Removed proper amount of damaged cord.	[ ]	[ ]	[ ]	[ ]
2.	Held knife properly when removing insulation so as not to cut any of wires.	[ ]	[ ]	[ ]	[ ]
3.	Used a sewing thread to wrap ends to prevent raveling if insulation was fabric or asbestos.	[ ]	[ ]	[ ]	[ ]
4.	Scraped wires until bright so as to make good electrical connection.	[ ]	[ ]	[ ]	[ ]
5.	Looped each wire around each prong on the plug for strength.	[ ]	[ ]	[ ]	[ ]
6.	Tightened screw so that no strands of wire were left out from the terminal screw.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No.69

Gardening-
Groundskeeping

Maintaining Equipment

CLEANING AND OILING ELECTRIC MOTORS

Objective No. 126

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing grounds work is to clean and oil electric motors. Electric motors must be cleaned and oiled regularly if they are to perform satisfactorily and give service for a long time. In this learning activity package you will learn to clean and oil electric motors, including packing bearings with proper type grease, if needed.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with an electric motor, manufacturer's manual, lubrication materials and access to tools, clean and lubricate the motor. Type and quality of the lubricant should meet the recommendations of the manufacturer of the motor. Moving parts should turn freely.

LEARNING ACTIVITIES

1 READ *Electric Motors – Selection, Protection, Drives,* Section on Cleaning and oiling, AAVIM, Athens, Ga.

2 READ the Instructions.

3 CHECK YOUR KNOWLEDGE of cleaning and oiling electric motors by taking the Student Self-Check.

4 OBSERVE another student as he or she is satisfactorily checked-out on this learning activity package.

5 PRACTICE performing the task of cleaning and oiling electric motors. Follow the procedure outlined in Learning Activity 2.

6 ARRANGE with your instructor to complete this package by going through the Check-Out Activity.

SAFETY

Turn off equipment before cleaning and oiling.

EQUIPMENT NEEDED

1. Electric motor
2. Oil can

3. Air hose for removing dust - vacuum cleaner may be used if air hose is not available
4. Manufacturer's Manual

MATERIALS NEEDED

1. Oil
2. Rags
3. Sandpaper for cleaning commutator
4. Small block of wood to wrap sandpaper around
5. Ball bearing grease, if bearings not sealed.

INSTRUCTIONS

CLEANING AND OILING ELECTRIC MOTORS

(1) Remove end shield or other covers.

(2) Use vacuum or compressed air to remove dirt or dust from all interior parts.

(3) Clean commutator, if applicable.

(4) Oil bearings, if applicable.

(5) Pack or lubricate bearings, if applicable.

(6) Replace shield and other covers.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

CLEANING AND OILING ELECTRIC MOTORS

Answer the following:

1. Electric motors should be oiled regularly but oil should be used sparingly.

   True ___ False ___

2. Ordinary cup grease is good enough to grease the ball bearings of an electric motor.

   True ___ False ___

3. How often should the bearings be lubricated after they leave the factory, if the bearings are sealed?

4. What grit (number) sandpaper should be used to clean the commutator of the electric motor?

5. What grade lubricant do you use on the bearings of an electric motor?

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, CLEANING AND OILING ELECTRIC MOTORS.

Clean and lubricate the electric motor designated by your instructor. You may refer to the manufacturer's manual.

CORRECT RESPONSES

1. True. If too much oil is used it will penetrate the insulation and damage it.
2. False. Use grease recommended by manufacturer. Ordinary cup grease will break down when it gets hot.
3. Bearings should never be lubricated if they are sealed at the factory.
4. Number 00 grit sandpaper
5. Use the grade recommended by the manufacturer.

DO NOT WRITE ON THIS SHEET

LAP 69

Student ______________________

Date ______________________

CLEANING AND OILING ELECTRIC MOTORS

Instructor's Final Checklist

Check the student's performance in the following elements of cleaning and oiling electric motors.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Turned power off before beginning to clean and oil electric motor.	☐	☐	☐	☐
2. Checked air hose or vacuum cleaner to properly clean the motor.	☐	☐	☐	☐
3. Cleaned commutator by using sandpaper, No. OO and a block of wood.	☐	☐	☐	☐
4. Used correct grade grease to grease bearings.	☐	☐	☐	☐
5. Used oil sparingly to prevent contact with wire insulation.	☐	☐	☐	☐
6. Wiped spilled oil with a rag.	☐	☐	☐	☐

Learning Activity Package No. 70

Gardening-
Groundskeeping

Maintaining Equipment

REPAIRING LEAKING FAUCETS

Objective No. 132

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing groundswork is to replace or repair leaking faucets. Faucets must be kept in good condition so that they do not drip when turned off. This condition may cause a sloppy area around the faucet. It will also increase the water bills. In this learning activity package you will learn to repair leaking faucets.

DIRECTIONS

Read the objective below. If you think you are ready to perform this tasks, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a wrench, screwdriver, knife, washers and a seat-dressing tool, repair a leaking water faucet. The repaired faucet should not leak when water pressure is applied.

LEARNING ACTIVITIES

1 READ *Mechanics in Agriculture*, pp. 655-657 by Lloyd J. Phipps, The Interstate Printers and Publishers, 1967.

or ______________________________

2 READ the Instructions,

or ______________________________

3 CHECK YOUR KNOWLEDGE of repairing leaking faucets by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of repairing a leaking faucet. Follow the procedure outlined in Learning Activity 2.

6 ARRANGE with your instructor to complete this package by going through the Check-Out Activity.

EQUIPMENT NEEDED

1. Screwdriver
2. Adjustable or open end wrench of correct size
3. Knife
4. Seat dressing tool

MATERIALS NEEDED

Washers, assorted sizes

INSTRUCTIONS

REPAIRING LEAKING FAUCETS

(1) Shut off water at source.

(2) Remove cap of faucet.

(3) Remove stem from body of faucet.

(4) Remove screw that holds seat washer.

(5) Dress washer seat, if needed.

(6) Replace seat washer and replace screw.

(7) Replace stem in faucet.

(8) Replace faucet cap.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

REPAIRING LEAKING FAUCETS

Answer the following.

1. The first operation in repairing a leaky faucet is to unscrew the cap.

   True ___ False ___

2. There are three principal types of water faucets.

   True ___ False ___

3. ________ to ________ percent of the cost of a house is invested in plumbing, therefore adequate care of plumbing is needed.

4. Washers and packing for all types of faucets can be bought relatively cheaply.

   True ___ False ___

5. A pipe wrench should not be used on the faucet because it may mar the surface.

   True ___ False ___

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, REPAIRING LEAKING FAUCETS.

Repair a leaking water faucet.

CORRECT RESPONSES

1. False. First, shut off the water at its source.
2. True
3. 5% to 10%
4. True
5. True

DO NOT WRITE ON THIS SHEET

LAP 70

Student ____________________

Date ____________________

REPAIRING LEAKING FAUCETS

Instructor's Final Checklist

Check the student's performance in the following elements of repairing leaking faucets.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Shut off water at its source.	[ ]	[ ]	[ ]	[ ]
2.	Used proper wrench to prevent marring of the faucet.	[ ]	[ ]	[ ]	[ ]
3.	Used proper size washer for the type faucet being repaired.	[ ]	[ ]	[ ]	[ ]
4.	Used a seat grinding tool to smooth the seat if washer seat was damaged.	[ ]	[ ]	[ ]	[ ]
5.	Replaced faucet cap properly.	[ ]	[ ]	[ ]	[ ]
6.	The faucet did not leak when water pressure was applied.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 71

Gardening-
Groundskeeping

Maintaining Equipment

PREPARING EQUIPMENT FOR PAINTING

Objective No. 134

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is to prepare groundskeeping equipment for painting. Groundskeeping equipment must be kept in good condition, including good paint, if it is to provide good service over a long period of time. In this learning activity package you will learn to properly clean and prepare the equipment before the paint is applied.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Using necessary tools and materials, prepare groundskeeping equipment for painting. Surfaces to be painted must be free of dents, old paint chips, dirt, and rust.

LEARNING ACTIVITIES

1 READ *Mechanics in Agriculture* Chapter 11, p. 193, by Lloyd J. Phipps, The Interstate Printers and Publishers, Inc., 1967.

or ______________________________

2 READ *Automotive Refinishing Principles and Techniques,* pp. 15-21.

3 READ the instructions, PREPARING EQUIPMENT FOR PAINTING.

or ______________________________

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 FOLLOW THE PROCEDURE outlined in Learning Activity 3.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

TOOLS AND EQUIPMENT NEEDED

Compressed air machine
Paint spray gun
Wire brush
Electric sander
Body hammer
Body dolly
Body file

MATERIALS NEEDED

- Sandpaper
- Rust inhibitor primer paint
- Cleaning solvent
- Masking tape

SAFETY

Be sure to use a respirator if painting is going to be done inside. Avoid breathing fumes.

The electric sander is a very dangerous tool; do not stand on a wet floor when using it; stay alert; use as directed; wear safety goggles.

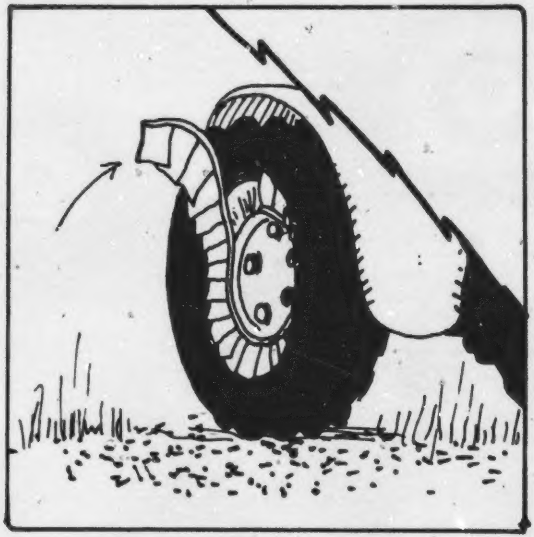


Figure 1. A tip for masking tractor tires—pleat paper every 4-6 inches (10-15 cm).

INSTRUCTIONS

PREPARING EQUIPMENT FOR PAINTING

(1) Clean dirt, grease, old paint, and rust from areas to be painted.

(2) Straighten dents in metal.

(3) Sand rough areas with orbital sander and sandpaper.

(4) Mask paint borders with masking tape.

(5) Prime bare areas.

(6) Set up equipment for painting in dry place.

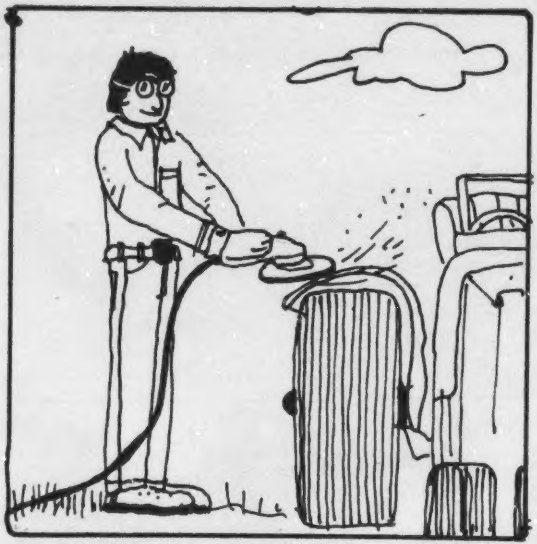


Figure 2. When using the electric sander, stand behind the sander such that sparks fly away from your body. Remember WEAR GOGGLES AND NEVER STAND ON A WET SURFACE WHEN SANDING.

STUDENT SELF-CHECK

PREPARING EQUIPMENT FOR PAINTING

DO NOT WRITE ON THIS SHEET

Answer the following.

1. A special rust preventing primer must be used to prevent rust on metal.
   True ___ False ___

2. All rust, dirt and grease must be removed before the rust preventing primer is used.
   True ___ False ___

3. Gasoline may be used to clean metal parts.
   True ___ False ___

4. Rust often starts in _________ and _______, therefore these places should be cleaned and primed thoroughly.

5. When applying a finish coat, an easy way of applying is _______.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CORRECT RESPONSES

1. True. Paint prevents rust but will not stop it.
2. True. Otherwise the rust will continue to worsen.
3. False. Use a solvent.
4. Cracks and crevices
5. Spraying

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, PREPARING EQUIPMENT FOR PAINTING.

Prepare groundskeeping equipment for painting. Appropriate materials will be provided for you.

DO NOT WRITE ON THIS SHEET

LAP 71

Student ______________________

Date ______________________

PREPARING EQUIPMENT FOR PAINTING

Instructor's Final Checklist

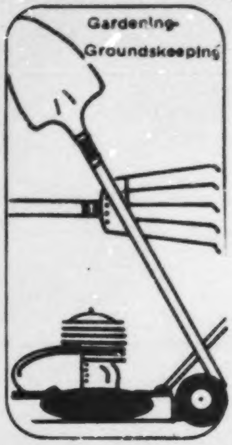
Check the student's performance in the following elements of preparing equipment for painting.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Cleaned parts properly before the primer coat was applied.	☐	☐	☐	☐
2. Used sandpaper or wire brush to remove rust.	☐	☐	☐	☐
3. Used a proper solvent, not gasoline for cleaning.	☐	☐	☐	☐
4. Applied primer coat so that it covered cracks, crevices, seams, and bolts.	☐	☐	☐	☐

Learning Activity Package No.72



Maintaining Equipment

PAINTING EQUIPMENT

Objective No. 135

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is to paint groundskeeping equipment. Groundskeeping equipment must be kept clean and free of rust if it is to give good service over a long period of time. It must be properly cleaned and given a primer coat of rust preventive before painting. In this learning activity package you will learn how to paint groundskeeping equipment.

DIRECTIONS

Before you begin to work on this learning activity package, be sure you have completed Learning Activity Package 71, Preparing Equipment for Painting.

If you have completed this learning activity package, read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Furnished the item to be painted, paint gun, respirator, and compressed air source, apply two coats of paint to used groundskeeping equipment. The completed paint job should be smooth, glossy, and without runs.

LEARNING ACTIVITIES

1. READ the manufacturer's instruction manual on the spray gun you will be using.

   or ______________________________

   READ *Automotive Refinishing Principles and Techniques* (relevant chapter).

2. VIEW the slide tape presentation TM-96, "Painting a Tractor." (This slide tape was developed by the Department of Vocational Education of the University of Kentucky and is recommended for use with the Tractor Mechanics learning activity packages.)

3. READ the instructions.

4. CHECK YOUR KNOWLEDGE of painting gardening and groundskeeping equipment by taking the Student Self-Check.

5. OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY

1. Be sure to wear respirator
2. Use exhaust system if painting is being done inside a building

EQUIPMENT NEEDED

1. Groundskeeping equipment that has been properly cleaned for painting
2. Painting equipment, air compressor and spray gun
3. Respirator

MATERIALS NEEDED

1. Paint or lacquer, thinned to correct viscosi
2. Strainer, for straining paint when putting into spray gun
3. Rags, for wiping excess paint

INSTRUCTIONS

PAINTING EQUIPMENT

1. Determine type paint coating required.
2. Set up paint equipment.
3. Adjust air pressure on paint gun.
4. Thin paint as necessary.
5. Fill paint gun through strainer.
6. Turn on exhaust system in shop, if applicable.
7. Put on respirator.
8. Adjust paint gun.
9. Paint equipment as follows:
    a. hold paint gun nozzle 6 to 8 inches (15 cm to 20 cm) from area to be painted.
    b. spray paint mist on area until covered, using a back and forth motion with paint gun nozzle.
10. Use rag to remove paint on components not to be painted.
11. Clean all components on paint gun with solvent.
12. Store paint equipment and supplies.

STUDENT SELF-CHECK
DO NOT WRITE ON THIS SHEET
ADJUSTING AND USING A PAINT GUN

Answer the following:

1. A spray gun should be held at a distance of ___ to ___ inches from the surface being sprayed.

2. A spray gun can be adjusted only for vertical or horizontal spraying.

   True ___ False _____

3. When painting the top of a hood or fender, how should you hold the paint gun?

4. When spraying from left to right and right to left on a vertical surface, how should you move the paint gun?

5. You should release the_______ of the spray gun at the end of each press.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next Learning Activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, PAINTING EQUIPMENT.

Apply two coats of paint to groundskeeping equipment positioned in a protected area.

CORRECT RESPONSES

1. 6 to 8 inches (15 to 20 cm)
2. False
3. straight over surface pointing gun down
4. parallel to surface and not in an arc
5. trigger

DO NOT WRITE ON THIS SHEET

LAP 72

Student ____________________

Date ____________________

PAINTING EQUIPMENT

Instructor's Final Checklist

Check the student's performance in the following elements of painting equipment.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Used a clean, dry location when applying paint.	[ ]	[ ]	[ ]	[ ]
2. Used a respirator.	[ ]	[ ]	[ ]	[ ]
3. Set correct air pressure on air compressor.	[ ]	[ ]	[ ]	[ ]
4. Strained paint before putting it into spray gun.	[ ]	[ ]	[ ]	[ ]
5. Applied paint so that it did not run.	[ ]	[ ]	[ ]	[ ]
6. Cleaned painting equipment properly and stored after its use.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 73

Gardening-
Groundskeeping

Maintaining Equipment

CLEANING AND LUBRICATING FERTILIZER APPLICATORS

Objective No. 128

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping is to clean and lubricate a centrifugal fertilizer applicator.

Cleaning and lubricating must be done regularly and properly if the applicator is to give good service and have a long, useful life. In this learning activity package you will learn how to properly clean and lubricate the centrifugal fertilizer applicator.

DIRECTIONS

Read the objectives below. If you think you are already able to perform these tasks, read the Check-Out Activities. Then, arrange with your instructor to complete the Check-Out Activities,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVES

Provided with a centrifugal fertilizer spreader and access to water and cleaning supplies, clean the fertilizer spreader. All foreign particles should be removed from the hopper, gears, distributing wheel, and other exposed areas. The washed parts must be thoroughly dried and protected against rust.

Provided with a clean centrifugal spreader, manufacturer's manual, and access to lubricating materials and supplies, lubricate the centrifugal spreader. All points of lubrication specified in the manufacturer's manual must show evidence of being lubricated. The type and quality of lubricant must conform with recommendations of the equipment manufacturer.

LEARNING ACTIVITIES

1 READ *Owner's Manual.*

or ______________________________

2 READ the Instructions, CLEANING AND LUBRICATING FERTILIZER APPLICATORS.

or ______________________________

3 CHECK YOUR KNOWLEDGE of cleaning and lubricating a centrifugal fertilizer applicator by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 **PRACTICE** performing the task of cleaning and lubricating a centrifugal fertilizer applicator.

6 **ARRANGE** with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Remember fertilizer is a poisonous chemical.

EQUIPMENT NEEDED

1. Centrifugal spreader
2. Owner's manual
3. Oil can

MATERIALS NEEDED

1. Rags
2. Water
3. Oil or lubricating (general purpose) grease

INSTRUCTIONS

CLEANING AND LUBRICATING FERTILIZER APPLICATORS

To Clean:

(1) Thoroughly wash spreader with water and cleaning agents.

(2) Inspect spreader for residue.

(3) Use brush and/or cleaning materials to remove any undissolved fertilizer.

(4) Rinse spreader with hose and water.

(5) Dry spreader in sun.

(6) Remove water from gears or other unexposed areas with dry, clean cloth.

(7) Coat all gears with oil or grease after washing to prevent rust.

To Lubricate:

(1) Locate lubrication point(s), using manufacturer's manual.

(2) Determine type of lubricant to use, following instructions in manufacturer's manual.

(3) Perform lubrication operation for each lubrication point.

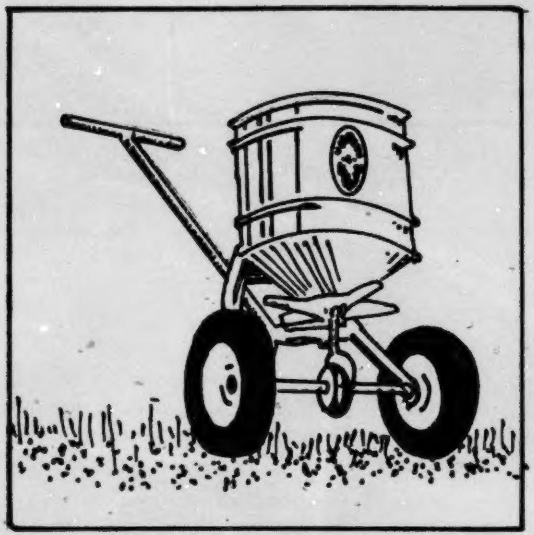


Figure 1. Cleaning and lubricating a fertilizer spreader must be considered a regular part of usage. Fertilizer can corrode a spreader to the point it is not usable in a year if not cleaned and lubricated.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

CLEANING AND LUBRICATING FERTILIZER APPLICATORS

Answer the following.

1. Washing applicator after use, with a garden hose is all the cleaning it needs.

   True ___ False ___

2. How should spreader be dried after washing?

   a. with a rag
   b. blow water off with air hose
   c. in the sun

3. How should water be removed from gears?

4. What material should be used to coat gears after washing?

5. How should lubrication points be located?

6. Moisture should not be trapped in the _____ areas.

7. How can the gear box be opened?

8. How much grease should be in the gear box?

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklist, CLEANING AND LUBRICATING FERTILIZER APPLICATORS.

Clean and lubricate the centrifugal spreader designated by your instructor.

CORRECT RESPONSES

1. False. Water and a detergent should be used
2. c
3. With a dry, clean cloth
4. Oil or grease
5. By using the manufacturer's manual
6. Bearing
7. By prying off the snap rings
8. A reasonable amount; do not overfill

DO NOT WRITE ON THIS SHEET

LAP 73

Student ______________________

Date ______________________

CLEANING AND LUBRICATING FERTILIZER APPLICATORS

Instructor's Final Checklist

Check the student's performance in the following elements of cleaning and lubricating fertilizer applicators.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Cleaned spreader using water and a suitable detergent.	☐	☐	☐	☐
2. Inspected spreader to determine if any fertilizer residue was left on it.	☐	☐	☐	☐
3. Rinsed spreader with hose and water.	☐	☐	☐	☐
4. Dried spreader in the sun.	☐	☐	☐	☐
5. Removed water from unexposed areas with a dry, clean cloth.	☐	☐	☐	☐
6. Used Manufacturer's Manual to locate lubrication points.	☐	☐	☐	☐
7. Used lubricant recommended in the Manufacturer's Manual.	☐	☐	☐	☐
8. Lubricated each lubrication point.	☐	☐	☐	☐

Learning Activity Package No. 74

Gardening-
Groundskeeping

Maintaining Equipment

SHARPENING ROTARY-TYPE MOWER CUTTING BLADE

Objective No. 129

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is sharpening a rotary-type mower cutting blade. In order to do a good job of mowing, so that the grass is cut smoothly with a sharp cut rather than tearing the blades, the mower cutting blade must be kept sharp.

In this learning activity package you will learn to remove, sharpen, and balance the blade of a rotary-type mower.

DIRECTIONS

Read the objective below. If you think you are already able to perform this task, read the Check-Out Activity. Then arrange with your instructor about doing the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a rotary blade grinder-balancer, safety glasses, and manufacturer's manual for grinding machine, sharpen and balance the blade. The cutting edge angle should be between 28° and 32° after sharpening. The blade is balanced if blade end drops no more than 1" (2.54 cm) when tested on a balanced cone.

LEARNING ACTIVITIES

1. READ "Operating, Repairing and Maintaining Small Power Equipment," pp. 8 and 9 in *Ornamental Horticulture*, Section X, Voc. Agric. Division of Voc. Ed., State Dept. of Ed. and Dept. of Ag. Ed. and Vocational Education Media Center, Clemson University, 1965.

   or ______________________________

   READ the Instructions, SHARPENING ROTARY-TYPE MOWER CUTTING BLADE.

   or ______________________________

2. CHECK YOUR KNOWLEDGE of sharpening a rotary-type mower cutting blade by taking the Student Self-Check.

3. OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

4. PRACTICE performing the task of sharpening a rotary-type mower cutting blade.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY

If grinder is used to sharpen blade, be sure that safety glasses are worn.

EQUIPMENT NEEDED

1. Emery grinding stone or flat file
2. Rotary blade

MATERIALS NEEDED

1. Rod for balancing blade
2. Saw horses for resting rod on or a blade balancer

INSTRUCTIONS

SHARPENING ROTARY-TYPE MOWER CUTTING BLADE

(1) Adjust blade guide to position approximately 1 1/2" (3.81 cm) ahead of grinding wheel spindle.

(2) Raise grinding wheel so that wheel clears mower blade.

(3) Hold blade firmly with both hands and stand to right-hand side of grinder. CAUTION: Wear safety glasses for grinding.

(4) Turn on motor and lower grinding wheel until it touches blade cutting edge.

(5) Slide blade from side to side on grinding wheel.

(6) Repeat steps for other end of blade.

(7) Check balance of blade by placing it on step cone of balancer.

(8) Balance blade by removing metal with grinder on back side of appropriate blade end.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

SHARPENING ROTARY-TYPE MOWER CUTTING BLADE

Complete the following statements.

1. Before removing the blade, the ____________ should be disconnected.

2. Blade may be sharpened by using a _______ or a _______ .

3. Before replacing the sharpened blade, it must be properly _______.

4. The blade may be checked for balance by mounting on a rod or by using a _______ .

5. If blade is not properly balanced, the heavy end should be________or filed to make it lighter.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go thorugh this activity, your instructor will rate your performance using the Instructor's Final Checklist, SHARPENING ROTARY-TYPE MOWER CUTTING BLADE.

Sharpen and balance a rotary-type cutting blade.

CORRECT RESPONSES

1. Spark plug wire
2. Grinder or a file
3. Balanced
4. Blade balancer
5. Ground

DO NOT WRITE ON THIS SHEET

LAP 74

Student ____________________

Date ____________________

SHARPENING ROTARY-TYPE MOWER CUTTING BLADE

Instructor's Final Checklist

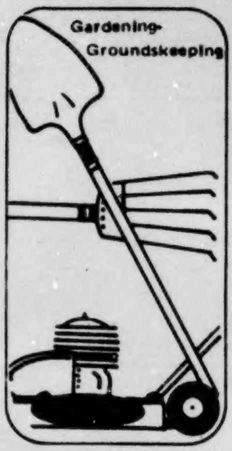
Check the student's performance in the following elements of sharpening rotary-type mower cutting blade.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Adjusted grinding wheel before grinding blade properly.	☐	☐	☐	☐
2. Wore safety glasses while blade was being ground.	☐	☐	☐	☐
3. Sharpened blade by sliding blade back and forth on grinding wheel properly.	☐	☐	☐	☐
4. Balanced blade by grinding metal off back side of appropriate end of blade.	☐	☐	☐	☐

Learning Activity Package No. 75



Maintaining Equipment

ADDING OIL IN SMALL ENGINES

Objective No. 140

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform as a groundskeeper will be to add oil in small engines. A small engine must be kept full of good oil if the engine is to give good service over a long period of time. In this learning activity package you will learn to check the oil to see if oil should be added, and to drain and refill with new oil when needed.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a manufacturer's manual and type oil recommended by manufacturer, add oil in a small engine. When completed, the dipstick or plug will show that the oil is level with the "full" mark. There must be no oil leaks around parts which have been removed and replaced when the engine is placed back into operation.

LEARNING ACTIVITIES

1 READ *Briggs and Stratton Repair Manual III*, Briggs and Stratton Corp., Form MS-4750-48, read Chapter 8, "Lubrication."

or ____________________________

2 READ the Instructions.

3 CHECK YOUR KNOWLEDGE of adding oil in small engines by taking the Student Self-Check.

4 OBSERVE another student as he or she performs and is satisfactorily checked-out on this learning activity package.

5 FOLLOW the procedure outlined in Learning Activity 2.

6 ARRANGE with you instructor to complete this package by going through the Check-Out Activity.

SAFETY

Be sure to disconnect spark plug wire before doing maintenance on small engines.

EQUIPMENT NEEDED

1. Small engine, Briggs and Stratton
2. Wrench for removing oil drain plug
3. Manufacturers' service manual

MATERIALS NEEDED

1. Oil, recommended type
2. Container (to collect old oil)
3. Rags

INSTRUCTIONS

ADDING OIL IN SMALL ENGINES

(1) Operate engine until warm.

(2) Remove oil fill plug and check level of oil, or check level of oil with dipstick.

(3) Fill crankcase with oil recommended by manufacturer. CAUTION: Never overfill crankcase.

(4) Replace plugs or covers removed when checking oil level and filling crankcase.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

ADDING OIL IN SMALL ENGINES

Answer the following.

1. High quality, detergent oil should be used in small engines.

   True ___ False ___

2. Detergent oils retard the formation of _____ and _____ deposits in the small engine.

3. Use *special additives* in the oil in a small engine.

   True ___ False ___

4. In a small engine the oil should be changed after _____ hours of operation.

5. The engine oil should be (cold, warm) when it is drained from the crankcase.

6. Oil level in the crankcase should be checked after every (5, 10, 15) hours of operation of the small engine.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

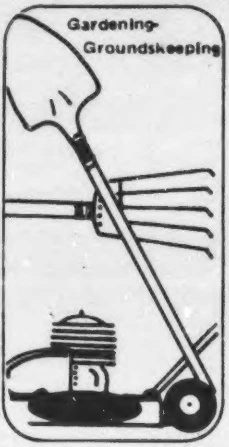
The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Add oil in a small engine.

CORRECT RESPONSES

1. True. Quality oil is always a good investment.
2. Gum and varnish
3. False. The oil recommendations have been made after extensive testing.
4. 25
5. Warm, so that more of the old oil will drain out.
6. 5

Learning Activity Package No. 75



Maintaining Equipment

ADDING OIL IN SMALL ENGINES

Objective No. 140

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform as a groundskeeper will be to add oil in small engines. A small engine must be kept full of good oil if the engine is to give good service over a long period of time. In this learning activity package you will learn to check the oil to see if oil should be added, and to drain and refill with new oil when needed.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a manufacturer's manual and type oil recommended by manufacturer, add oil in a small engine. When completed, the dipstick or plug will show that the oil is level with the "full" mark. There must be no oil leaks around parts which have been removed and replaced when the engine is placed back into operation.

LEARNING ACTIVITIES

1 READ *Briggs and Stratton Repair Manual III,* Briggs and Stratton Corp., Form MS-4750-48, read Chapter 8, "Lubrication."

or ______________________________

2 READ the Instructions.

3 CHECK YOUR KNOWLEDGE of adding oil in small engines by taking the Student Self-Check.

4 OBSERVE another student as he or she performs and is satisfactorily checked-out on this learning activity package.

5 FOLLOW the procedure outlined in Learning Activity 2.

6 ARRANGE with you instructor to complete this package by going through the Check-Out Activity.

SAFETY

Be sure to disconnect spark plug wire before doing maintenance on small engines.

EQUIPMENT NEEDED

1. Small engine, Briggs and Stratton
2. Wrench for removing oil drain plug
3. Manufacturers' service manual

MATERIALS NEEDED

1. Oil, recommended type
2. Container (to collect old oil)
3. Rags

INSTRUCTIONS

ADDING OIL IN SMALL ENGINES

(1) Operate engine until warm.

(2) Remove oil fill plug and check level of oil, or check level of oil with dipstick.

(3) Fill crankcase with oil recommended by manufacturer. CAUTION: Never overfill crankcase.

(4) Replace plugs or covers removed when checking oil level and filling crankcase.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

ADDING OIL IN SMALL ENGINES

Answer the following.

1. High quality, detergent oil should be used in small engines.

   True ___ False ___

2. Detergent oils retard the formation of _____ and _____ deposits in the small engine.

3. Use *special additives* in the oil in a small engine.

   True ___ False ___

4. In a small engine the oil should be changed after _____ hours of operation.

5. The engine oil should be (cold, warm) when it is drained from the crankcase.

6. Oil level in the crankcase should be checked after every (5, 10, 15) hours of operation of the small engine.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Add oil in a small engine.

CORRECT RESPONSES

1. True. Quality oil is always a good investment.
2. Gum and varnish
3. False. The oil recommendations have been made after extensive testing.
4. 25
5. Warm, so that more of the old oil will drain out.
6. 5

DO NOT WRITE ON THIS SHEET

LAP 75

Student ______________________

Date ______________________

ADDING OIL IN SMALL ENGINES

Instructor's Final Checklist

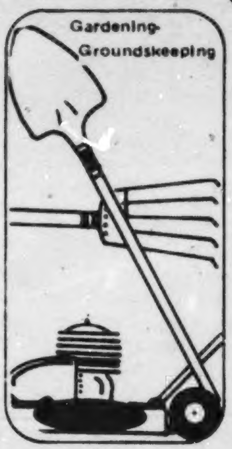
Check the student's performance in the following elements of adding oil in small engines.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Operated engine before oil was drained to get the oil warm.	☐	☐	☐	☐
2. Removed spark plug wire before oil was drained.	☐	☐	☐	☐
3. Replaced drain plug before new oil was added.	☐	☐	☐	☐
4. Checked label on oil can to see that new oil was of proper type.	☐	☐	☐	☐
5. Replaced filler plug cap and tightened after new oil was added to crankcase.	☐	☐	☐	☐

Learning Activity Package No. 76



Maintaining Equipment

SERVICING CARBURETOR AIR CLEANERS ON SMALL ENGINES

Objective No. 142

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs is to service the carburetor air cleaner on small engines.

Carburetor air cleaners must be kept clean or damage will result to the cylinder, rings, and pistons due to dust particles entering and acting as abrasives in the cylinder.

In this learning activity package you will learn how to service the carburetor air cleaner and how often the servicing should be done.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task read the Check-Out Activity. Then arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given screwdrivers, container for washing parts, filter lubricant, and clean rags, service a carburetor air cleaner on a small engine. A visual inspection of the completed work must show that all dirt has been removed from the cleaner, and the cleaner securely installed.

LEARNING ACTIVITIES

1 READ "Briggs and Stratton Repair Instructions III" (Briggs and Stratton Corp., Form MS-4750-48), Chapter 3, Carburetion, pp. 27-28.

or ______________________________

2 READ the instructions.

3 CHECK YOUR KNOWLEDGE of servicing carburetor air cleaners by taking Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of servicing the carburetor air cleaner on a small engine.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Disconnect spark plug wire.

TOOLS AND EQUIPMENT NEEDED

Screwdrivers
Container for washing parts

MATERIALS AND SUPPLIES NEEDED

30w oil for lubricating filter
Clean rags
Kerosene or varsol for cleaning parts

INSTRUCTIONS

SERVICING CARBURETORS AND AIR CLEANERS ON SMALL ENGINES

(1) Disconnect spark plug wire for safety precaution.

(2) Clean area around air cleaner and exterior of cleaner cover.

(3) Remove air cleaner cover.

(4) Cover air intake opening with clean rag.

(5) Clean interior of cover.

(6) Clean and/or replace filter element, using manufacturer's instructions.
NOTE: Most small engines have an oil-saturated air cleaning filter element which can be cleaned and restored.

(7) Check intake opening for clogged dirt. Clean as necessary.

(8) Remove protective cover from air intake opening.

(9) Wipe air intake opening clean.

(10) Replace air cleaner assembly.

(11) Reconnect spark plug wire.

STUDENT SELF-CHECK

SERVICING CARBURETOR AIR CLEANERS ON SMALL ENGINES

DO NOT WRITE ON THIS SHEET
Answer the following:

1. A poorly serviced air cleaner may cause dust particles to get into the oil.

   True_____False _____

2. Dirt in the oil forms an abrasive, which wears the moving parts.

   True_____False_____

3. The foam air cleaner element should be cleaned and re-oiled after every ten hours of engine operation.

   True_____False_____

4. The air cleaner form element should be washed in (gasoline, kerosene).

5. What type oil should be used in the oil bath air cleaner?

CORRECT RESPONSES

1. True. This is bad because it causes excessive wear on the moving parts.
2. True
3. False. Clean after every 25 hours of normal engine operation.
4. Kerosene. Gasoline may cause a fire hazard.
5. The same type oil should be used in the oil bath air cleaner as is used in the crankcase.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, SERVICING CARBURETOR AIR CLEANERS ON SMALL ENGINES.

Service a carburetor air filter on a small engine.

DO NOT WRITE ON THIS SHEET

LAP 76

Student ____________________

Date ____________________

SERVICING CARBURETOR AIR CLEANERS ON SMALL ENGINES

Instructor's Final Checklist

Check the student's performance in the following elements of servicing carburetor air cleaners on small engines.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Removed air cleaner carefully to prevent dirt from entering carburetor.	☐	☐	☐	☐
2.	Removed spark plug wire for safety.	☐	☐	☐	☐
3.	Cleaned and dried foam properly.	☐	☐	☐	☐
4.	Saturated foam with oil and squeezed oil out.	☐	☐	☐	☐
5.	Removed air cleaner correctly and attached to carburetor.	☐	☐	☐	☐

Learning Activity Package No. 77

Gardening-
Groundskeeping

Maintaining Equipment

ADJUSTING ENGINE IDLE SPEED ON SMALL ENGINES

Objective No. 141

Ornamental Horticulture

INTRODUCTION

One of the tasks a groundskeeper performs when doing groundswork is to adjust the engine idle speed on small engines. Engine idle speed must be properly set if the small engine is to operate properly and give good service under load. In this learning activity package you will become familiar with the carburetor adjustments, including the engine idle speed adjustment.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given the manufacturer's manual and a screwdriver, adjust the engine idle speed on a small engine. The adjustment must prevent overspeeding and underspeeding.

LEARNING ACTIVITIES

1 READ *Briggs and Stratton Repair Instructions III.* (Briggs and Stratton Corp., Form MS-4750-48), Chapter 3, Carburetion, pp. 30-31, Carburetor Adjustment.

or ____________________

2 CHECK YOUR KNOWLEDGE of adjusting engine idle speed on small engines by taking the Student Self-Check.

3 OBSERVE another student as he or she satisfactorily performs and is checked-out on this learning activity package.

4 PRACTICE performing the task of adjusting engine idle speed on a small engine.

5 ARRANGE with your instructor to complete this package by going through the Check-Out Activities.

EQUIPMENT NEEDED

1. Screwdriver, correct size
2. Small engine
3. Pliers

MATERIALS NEEDED

1. Gasoline for small engine
2. Manufacturer's Manual

SAFETY

1. Accepted storage container for gasoline.
2. Keep room properly ventilated while small engine is running, to prevent carbon monoxide build up.
3. Keep hands and clothing away from spinning parts of the engine.

INSTRUCTIONS

ADJUSTING ENGINE IDLE SPEED ON SMALL ENGINES

(1) Check governor for bent links and wear. Repair as necessary.

(2) Determine recommended idle speed. NOTE: Most small engine carburetors have an idle speed stop screw.

(3) Start engine.

(4) Adjust tension on governor spring until desired idle speed is maintained.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

ADJUSTING ENGINE IDLE SPEED ON SMALL ENGINES

Answer the following.

1. The initial carburetor adjustment of the needle valve should be made before the idle adjustment is made.

   True ___ False ___

2. The needle valve is turned counter clockwise to close it.

   True ___ False ___

3. The first adjustment of the needle valve is to open it ____ turn(s).

   a. 1
   b. 1 1/2
   c. 2 1/2

4. The final needle valve adjustment should be made when the engine is running

   a. at normal operating speed.
   b. with throttle at full speed.

5. Describe how to make the engine idle adjustment.

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, ADJUSTING ENGINE IDLE SPEED ON SMALL ENGINES.

Adjust the engine idle speed on a small engine. You may refer to the manufacturer's manual for correct adjustments.

CORRECT RESPONSES

1. True
2. False. Turn it clockwise.
3. b. 1 1/2 turns
4. a. when engine is running at normal operating speed
5. Hold throttle in idle position, turn idle adjusting screw until fast idle is obtained.

DO NOT WRITE ON THIS SHEET

LAP 77

Student ________________________

Date ________________________

ADJUSTING ENGINE IDLE SPEED ON SMALL ENGINES

Instructor's Final Checklist

Check the student's performance in the following elements of adjusting engine idle speed on small engines.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Made initial needle valve adjustment properly.	[ ]	[ ]	[ ]	[ ]
2.	Checked carburetor and governor linkage for needed repairs.	[ ]	[ ]	[ ]	[ ]
3.	Made final needle valve adjustment when engine was running at normal operating speed.	[ ]	[ ]	[ ]	[ ]
4.	Held throttle in idle position while idle adjustment screw was turned to give fast idle.	[ ]	[ ]	[ ]	[ ]
5.	Tested engine under full load.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 78

Gardening-Groundskeeping

Maintaining Equipment

SERVICING BELT DRIVES, CHAIN DRIVES, GEAR DRIVES, AND VARIABLE SPEED DRIVES ON GROUNDSKEEPING EQUIPMENT

Objective No. 147

Ornamental Horticulture

INTRODUCTION

One of the tasks you will have to perform when doing gardening and groundskeeping work is to service the various kinds of drives on groundskeeping equipment.

These drives must be kept properly repaired, adjusted and serviced, if the equipment is to perform satisfactorily and have a long, useful life.

In this Learning Activity Package you will learn to properly adjust, repair and service the four types of drives on groundskeeping equipment.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a manufacturer's manual, solvents, lubricants and needed tools, service belt, chain, gear, and variable speed drives on groundskeeping equipment. All parts will be clean, lubricated, and adjusted to the tension recommended by the manufacturer.

LEARNING ACTIVITIES

1 READ *Groundskeeping Equipment*, Vol. I, AAVIM, by Colvin, 1974, pp. 27-28. and the Owner's Manual for each type drive you have on groundskeeping equipment.

or ____________________.

2 READ the Instructions.

3 CHECK YOUR KNOWLEDGE of servicing various types of drives on groundskeeping equipment by taking the Student Self-Check.

4 OBSERVE another student as he or she satisfactorily performs and is checked out on this learning activity package.

5 PRACTICE performing the task of servicing various type drives on groundskeeping equipment.

6 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activities.

SAFETY

Moving gears, pulley or chains are extremely dangerous. Make sure the ignition is off and all drives disengaged before servicing.

EQUIPMENT NEEDED

1. Groundskeeping equipment, one with belt drive, one with chain drive, one with gear drive and one with variable speed drive.
2. Wrenches, correct type and size as specified in owner's manuals.
3. Owner's manual for each piece of groundskeeping equipment.

MATERIALS NEEDED

1. Solvent, as instructed by owner's manuals.
2. Lubricant, type recommended in owner's manuals.

INSTRUCTIONS

Servicing Belt Drives, Chain Drives, Gear Drives, and Variable Speed Drives on Groundskeeping Equipment

Belt Drives:

(1) Note: There are three basic types of belt drives—flat belts, V-belts, and round belts. These may be made of leather, rubber, fabric, steel, wire, or combinations of these materials. They may have an opened, turned, crossed, surpentine or mule form.

(2) Check for signs of improper installation (belt stretches beyond take-up, fails for no visible reason, turns over, is cut on bottom, creeps or slips). Adjust as necessary.

(3) Check condition of pulleys and smooth or adjust as needed.

(4) Check belt alignment and tension. Adjust to specifications.

(5) Clean belt of oil and grease with cloth and solvent. Add belt dressing, if recommended by manufacturer.

(6) Clean belt shields and screens.

Chain Drives:

(1) Note: There are three basic types of chains—plain, roller, and silent.

(2) Remove connector link and clean chain in solvent. Lubricate as necessary.

(3) Clean driving sprocket, driver sprocket, and adjustable idler sprocket with brush and solvent. Lubricate as necessary.

(4) With connector link removed, wrap chain around sprockets, bringing free ends together on one sprocket, and install connector link. Tap chain pin links back so that fasteners are snug against connecting link plate.

(5) Adjust chain tension on adjustable idler sprockets.

Gear Drives:

(1) Check manufacturer's manual for type lubricant required.

(2) Open gears can be lubricated by:
   a. Splash pan in which gears run.
   b. Hand lubrication by brushing or squirting.
   c. Use of drip oiler.

(3) Check gear for excessive wear, breaks, or cracks.

(4) Replace gear parts as necessary.

Variable Speed Drives:

(1) Note: Variable speed drives are variations of the above gears. Follow service instructions given in manufacturer's manual.

(2) Clean parts.

(3) Lubricate as necessary.

(4) Adjust tension.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET

Answer the following:

1. Name the three basic types of belt drives:

2. Belts may be made of: leather, rubber, wire, steel, or combinations of these materials.
   a. one of the above
   b. none of the above
   c. all of the above

3. There are three basic types of chains: plain, roller, silent. (Circle the correct one or ones.)

4. Chains can be cleaned with a brush and ______________.

5. How do you determine the type lubricant needed for gear drives?

6. Variable speed drives are variations of gear drives. True False

CHECK-OUT ACTIVITIES

The statements below explain the activities you must be able to complete in order to finish this learning activity package. As you go through each activity, your instructor will rate your performance, using the Instructor's Final Checklists.

Service belt drives on groundskeeping equipment. You may use the manufacturer's manual.

Service chain drives on groundskeeping equipment. You may use the manufacturer's manual.

Service gear drives on groundskeeping equipment. You may use the manufacturer's manual.

Service variable speed drives on groundskeeping equipment. You may use the manufacturer's manual.

CORRECT RESPONSES

1. Flat belts, V-belts, round belts
2. c — all of the above
3. All of them — plain, roller, silent
4. Solvent
5. Follow instructions in owner's manual
6. True

DO NOT WRITE ON THIS SHEET

LAP 78

Student ____________________

Date ____________________

SERVICING BELT DRIVES, CHAIN DRIVES, GEAR DRIVES, AND VARIABLE SPEED DRIVES ON GROUNDSKEEPING EQUIPMENT

Instructor's Final Checklist

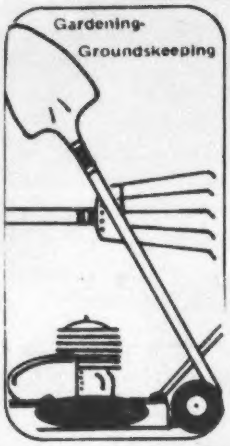
Check the student's performance in the following elements of servicing belt drives, chain drives, gear drives, and variable speed drives on groundskeeping equipment.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
SERVICING BELT DRIVES				
1. Checked for improper installation and adjusted belts.	☐	☐	☐	☐
2. Checked condition of pulleys and smoothed or adjusted as needed.	☐	☐	☐	☐
3. Checked belt alignment and tension and adjusted to specifications.	☐	☐	☐	☐
4. Cleaned belts with cloth and solvent, added belt dressing if needed.	☐	☐	☐	☐
5. Cleaned belt shields and screens.	☐	☐	☐	☐
SERVICING CHAIN DRIVES				
1. Removed and cleaned chain in solvent, and lubricated.	☐	☐	☐	☐
2. Cleaned and lubricated driving sprocket, driver sprocket, and idler sprocket.	☐	☐	☐	☐
3. Reinstalled and adjusted chain tension properly.	☐	☐	☐	☐

Learning Activity Package No. 79



Maintaining Equipment

CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS

Objective No. 130

Ornamental Horticulture

INTRODUCTION

For satisfactory operation and safety, the tires on a vehicle must be in good condition. Also, tires are generally large and expensive to replace on the larger tractors. Since many types of tire damage and undue wear can be traced to improper care, the tractor operator should make every effort to increase safety and minimize the cost of tire maintenance. In this learning activity package you will learn to check tires for proper pressure and to identify the causes of undue wear and defects.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given a tractor with worn and damaged tires, check the tires for proper inflation and visually examine tires for wear and defects. Recorded tire pressure must be 100 percent accurate. All defects must be identified.

LEARNING ACTIVITIES

1 READ *Tractor Operation and Daily Care*, American Association for Vocational Instructional Materials, Engineering Center, Athens, Georgia, pp. 24 (paragraph 3, 35-37, 91, 98).

or ______________________________

2 READ *Tractor Maintenance Procedures and Principles*, American Association for Vocational Instructional Materials, pp. 39-43.

or ______________________________

3 READ the Instructions, CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS.

4 CHECK YOUR KNOWLEDGE of checking tires for pressure, wear, and defects by taking the Student Self-Check.

5 ARRANGE with your instructor to complete this package by going through the Check-Out Activities.

SAFETY

1. Use approved safety practices in raising tractor to permit tire rotation (see p. 22, *Tractor Operation and Daily Care*, listed above).

2. Use approved safety practices in starting, moving, and parking tractor (see *Tractor Operation and Daily Care*, paragraph 1, p. 39; pp. 44-50, 54-58).

EQUIPMENT NEEDED

Tire pressure gauge

MATERIALS NEEDED

Clean water to wash tire pressure gauge, if tires contain calcium-chloride solution.

INSTRUCTIONS

CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS

(1) If tires are to be rotated, raise tractor using approved method.

(2) Remove valve cap and check tire pressure with gauge. If tire contains calcium-chloride solution, check with valve at top of the tire; add 1/2 pound pressure to the reading for each foot of liquid height in the tire. For example, if the air pressure with the valve at the top of the tire reads 12 lbs. and the liquid level in the tire is 3 feet, add 1 1/2 lbs. for liquid pressure to get the actual pressure of 13 1/2 lbs.

(3) Inflate to pressure recommended by tire manufacturer for the job or conditions under which it is operated. Write down the pressure to show your instructor.

(4) Replace valve cap.

(5) Wash gauge in clean water if tires contained calcium-chloride solution.

(6) Visually inspect tires:

   (a) Check side-walls for cuts or breaks. Low tire pressure may cause "bruise breaks," "buckle breaks" (sidewall buckling), and "side-wall cracking." Over inflation may cause rapid tread wear and sidewall "checking" (long exposure may also cause "checking").

   (b) Check tires for nails, embedded stones, cuts. Remove embedded materials, ascertaining that puncture does not extend through the tire carcass. If a cut or snag does not expose any fabric, after removing grit and dirt, remove loose rubber and bevel cut into a cone-shaped opening. This will prevent dirt from accumulating in the opening. Use a sharp narrow-bladed pen knife for making the opening.

   (c) Examine for faulty stems and valves. Replace any missing valve caps.

(7) Report your findings to your instructor or supervisor.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS

Answer the following:

1. The tires for the rear wheels of large tractors are designed to be installed so the chevron shaped lug bars point

   (a) forward at the top of the tire, in the direction of forward travel
   (b) to the rear at the top of the tire
   (c) either direction, without effecting traction or slippage

2. If additional weight is added to tractor tires or wheels, usually you must

   (a) decrease the pressure in the tires
   (b) increase the pressure in the tires
   (c) carry the same air pressure as before

3. If you are going to operate a tractor on paved roads for several hours it is advisable to

   (a) carry a lower than normal air pressure in the rear tires
   (b) carry a higher than normal air pressure in the rear tires
   (c) carry normal air pressure

4. Correct tire pressure for the tractor you are operating can be best determined by

   (a) referring to the operator's manual
   (b) checking with gasoline service stations
   (c) pressure recommendations stamped on the tire

5. Tire defects such as "bruise breaks" and "sidewall cracking" are due to

   (a) driving too fast
   (b) over inflation
   (c) under inflation

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS.

Check tractor tires for proper inflation. Visually inspect tires for defects and wear. Report findings to your instructor.

CORRECT RESPONSES

1. (a) 2. (b) 3. (b) 4. (a) 5. (c)

DO NOT WRITE ON THIS SHEET

LAP 79

Student ______________________

Date ______________________

CHECKING TIRES FOR PRESSURE, WEAR, AND DEFECTS

Instructor's Final Checklist

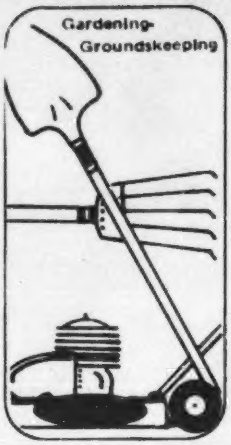
Check the student's performance in the following elements of checking tires for pressure, wear, and defects.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Raised tractor wheels in a safe manner, if tires are to be rotated.	[ ]	[ ]	[ ]	[ ]
2. Checked the tire pressure of all tires and recorded correctly.	[ ]	[ ]	[ ]	[ ]
3. Replaced all valve caps.	[ ]	[ ]	[ ]	[ ]
4. Identified all defects and signs of wear.	[ ]	[ ]	[ ]	[ ]
5. Cleaned and stored pressure gauge.	[ ]	[ ]	[ ]	[ ]

Learning Activity Package No. 80



Maintaining Equipment

REPLACING RADIATOR HOSES

Objective No. 150

Ornamental Horticulture

INTRODUCTION

A water-cooled engine depends upon a radiator to carry away excess heat to prevent engine damage. A liquid coolant is usually added to the water to prevent freezing in cold weather, slow down evaporation, and reduce rust and corrosion. The radiator hoses are important parts of the cooling system and are the parts most subject to wear or failure. These hoses are subject to rapid deterioration from heat, pressure, oxidation, vibration, and coolant system chemicals. Hoses should be inspected regularly, replacing those showing signs of weakness or damage. A replacement hose will usually cost less than the coolant that would be lost due to a broken or cracked hose. In this learning activity package you will learn how to replace a radiator hose.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given the necessary tools, radiator hose and clamps, replace a radiator hose on a tractor. The new hose should show no visible signs of leaks when the radiator is refilled with coolant and the engine is running.

LEARNING ACTIVITIES

1 READ *Tractor Maintenance Principles and Procedures*, American Association for Instructional Materials, 120 Engineering Center, Athens, Georgia 30601, pp. 119-128.

or ______________________________

2 READ *I & T Shop Manual* for tractor being serviced.

3 READ the instructions.

4 CHECK YOUR KNOWLEDGE by taking Student Self-Check, Replacing Radiator Hoses.

5 ARRANGE with your instructor to complete this learning activity package by going through the Check-Out Activity.

SAFETY

Make sure radiator pressure is relieved before removing hoses.

TOOLS AND EQUIPMENT NEEDED

1. Screwdriver or hose-clamp pliers, depending on type of clamps used
2. Scraper or pocket knife
3. Pressure tester and adapter, if available
4. Bucket or small tub in which to drain coolant

MATERIALS AND SUPPLIES NEEDED

1. New radiator hose(s)
2. New clamps if needed

INSTRUCTIONS

REPLACING RADIATOR HOSES

(1) Drain radiator system. (Note: if the coolant is to be re-used, drain the system only to a level below the hose to be replaced).

(2) Remove old hose.

(3) Clean the radiator neck and engine inlet/outlet fixtures.

(4) Install new hose. On many tractors the hose is made with an elbow or bend. You must use the proper hose for your make and model of tractor. Some older model tractors use a straight hose and it is necessary to see only that the hose is of the proper length.

(5) Refill with coolant and visually check for leaks.

(6) Tighten if any loose connections are found.

(7) Pressure test cooling system if testing equipment is available.

(8) Clean up area, store all tools or equipment used.

STUDENT SELF-CHECK

REPLACING RADIATOR HOSES

DO NOT WRITE ON THIS SHEET

Answer the following:

1. List four ways that radiator hoses can show that they are damaged:
   (a)
   (b)
   (c)
   (d)
2. How does a deteriorating hose cause a clogged radiator?
3. At least how often should radiator hoses be checked for damage or wear?

Check the following questions either True or False

4. A water-cooled engine cannot be operated for even a short time without water or other coolant in the radiator without danger of damaging the engine.

   True_____False_____

5. The only purpose of adding a "permanent-type" coolant or "anti-freeze" to a tractor cooling system is to prevent the water in the system from freezing.

   True_____False_____

6. Deterioration of radiator hose usually occurs more on the outside than on the inside of the hose.

   True_____False_____

7. Hardening of old hose causes little or no trouble with relation to leaking.

   True _____False_____

8. Excessive heat and chemicals cause the service life of radiator hose to be limited.

   True_____False _____

9. Engine vibration can loosen hose connections and cause abnormal wear.

   True_____False _____

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10. Leaks are more common at connections than anywhere else in the cooling system.

True_____False_____

CORRECT RESPONSES

1. Hardening, softening, cracking, swelling
2. Particles from rotted hose linings will clog radiator water tubes
3. Twice a year
4. True
5. False
6. False
7. False
8. True
9. True
10. True

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Replace a radiator hose on a tractor designated by your instructor.

LAP 80

Student ______________________

Date ______________________

DO NOT WRITE ON THIS SHEET

REPLACING RADIATOR HOSES

Instructor's Final Checklist

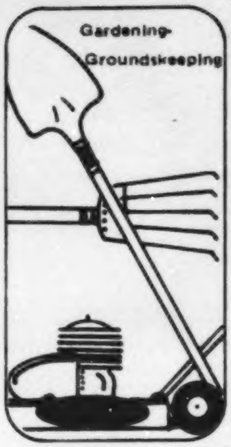
Check the student's performance in the following elements of replacing radiator hoses.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Saved old coolant, if it was re-usable.	☐	☐	☐	☐
2.	Fitted hose clamps properly.	☐	☐	☐	☐
3.	Made connections free of signs of leaking.	☐	☐	☐	☐
4.	Disposed of old hoses and put tools away.	☐	☐	☐	☐

Learning Activity Package No. 81



Maintaining Equipment

CHANGING ENGINE OIL

Objective No. 125

Ornamental Horticulture

INTRODUCTION

It is generally known that the crankcase oil in a motor acts as a lubricant, reducing friction and decreasing engine wear. But, in addition, the engine oil also performs other functions. It helps dissipate heat, cushions the impact of moving parts, and forms a seal between the piston and cylinder walls for better compression. After prolonged use, an engine's crankcase oil becomes diluted with fuel. The oil also becomes contaminated with dirt, water, sludge, and metal particles. It eventually loses most of its protective lubricating quality and should be changed, replacing it with new oil. In this learning activity package you will learn to change engine oil following the engine manufacturer's recommendations and specifications.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Given access to necessary tools and equipment and manufacturer's lubrication recommendations, change oil in a four-cycle engine. If applicable, replace engine oil filter. Oil must not escape from the drain plug or filter when the engine is placed back in operation.

LEARNING ACTIVITIES

1 READ *Tractor Maintenance Principles and Procedures,* American Association for Vocational Materials, 120 Engineering Center, Athens, Georgia 30601, pp. 29-36.

or ____________________

2 REVIEW the engine manufacturer's *Operating and Maintenance Instructions* for the lubrication recommendations of the manufacturer.

3 READ the instructions.

4 TEST YOUR KNOWLEDGE by taking the Student Self-Check.

5 ARRANGE with your instructor to complete this package by going through the Check-Out Activities.

SAFETY

If engine oil is being changed in a one cylinder engine, to prevent accidental starting, first remove the spark plug or remove the wire from the spark plug and insert terminal in the V-notch in cylinder head.

TOOLS AND EQUIPMENT NEEDED

1. Wrench for oil drain plug
2. Container for old oil
3. Wrench for oil filter, if needed

MATERIALS AND SUPPLIES NEEDED

1. Clean rags
2. Motor oil of recommended grade and type.
3. New filter cartridge, if engine has a filter
4. Pan of cleaning solvent – kerosene or diesel fuel, if engine has a filter

INSTRUCTIONS

CHANGING ENGINE OIL

1. Secure sufficient motor oil of the grade and type recommended by the engine manufacturer; if the engine has an oil filter, also secure a new oil filter element of approved type.
2. Operate the engine until thoroughly warm.
3. Stop the engine. With small,one cylinder engines, the spark plug wire should be disconnected to prevent accidental starting.
4. Place a pan under the drain and remove the drain plug. If the plug is magnetic, tap the plug against a solid object to remove sediment.
5. Allow oil to drain from crankcase.

Omit items 6-10 if the engine does not have an oil filter.

6. Locate the oil filter, if the engine has one. If a single cylinder engine, in most cases it will not have a crankcase filter. Check your operator's manual on this.
7. Wipe the dirt from filter and adjacent areas.
8. Place a pan under the filter. Remove the filter container. (Some filters have a drain plug which is removed before the filter body is removed.) Discard the old filter cartridge.
9. Clean the oil filter container with kerosene or diesel fuel.
10. Install a new filter cartridge and replace the entire assembly, taking care not to crimp the filter gasket.
11. Replace oil drain plug.
12. Check the manufacturer's manual for the capacity of the engine sump or crankcase and method of checking the required oil level.
13. Remove the oil filler plug or cap. If the cap serves also as a crankcase breather, then wash it in kerosene or diesel fuel and shake dry. Re-oil the mesh filter element with light crankcase oil. (See pp. 36-39 of reference 1 under Learning Activities).
14. Refill crankcase to specified level with approved class of oil. Use care to see that containers, funnel, etc. are free of dirt. After filling,replace the oil filler plug or cap.
15. Connect spark plug wire, if it has been disconnected; start engine.
16. Operate engine for a few minutes at idle speed.
17. Stop engine. Re-check oil level. Note areas around drain plug and oil filter (if any) for signs of leaks.
18. Store used oil in closed container. Put away all tools and supplies.

STUDENT SELF-CHECK

CHANGING ENGINE OIL

DO NOT WRITE ON THIS SHEET
Answer the following:

1. The interval at which crankcase oil should be changed is normally specified by
   - (a) the oil manufacturer
   - (b) the engine dealer
   - (c) a mechanic
   - (d) the engine manufacturer
2. The temperature and dirt conditions under which an engine operates
   - (a) will affect how frequently an oil change is needed
   - (b) will not affect how frequently an oil change is needed
   - (c) will not affect the frequency of needed oil changes if the engine has an oil filter
   - (d) will not affect the frequency of needed oil changes on new model engines
3. The function of the oil filter on tractors and other engines is
   - (a) to shorten the time for the oil to turn dark
   - (b) to remove abrasive dirt and other foreign materials from the oil.
   - (c) to reduce the temperature of the engine
   - (d) to introduce oil "additives", making the oil last longer
4. The oil capacity of the engine sump or crankcase can be found
   - (a) stamped on the engine nameplate
   - (b) recorded on the crankcase oil dipstick
   - (c) in the manufacturer's owner's manual or operating and maintenance instructions
   - (d) only by testing the amounts of oil needed to fill it

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist.

Change oil in the four-cycle engine designated by your instructor. If applicable, change engine oil filter element and clean the crank-case breather.

CORRECT RESPONSES

1. (d) 2. (a) 3. (b) 4. (c)

DO NOT WRITE ON THIS SHEET

LAP 81

Student ____________________

Date ____________________

CHANGING ENGINE OIL

Instructor's Final Checklist

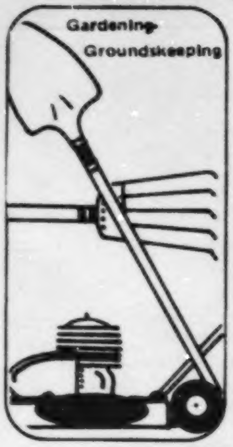
Check the student's performance in the following elements of changing engine oil.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

		Student Performance			
		Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1.	Followed safety practices	☐	☐	☐	☐
2.	Checked the operator's manual for type and weight of oil	☐	☐	☐	☐
3.	Filled the engine correctly	☐	☐	☐	☐
4.	Cleaned filter element container if the engine had an oil filter	☐	☐	☐	☐
5.	Installed a new cartridge properly if the engine had an oil filter	☐	☐	☐	☐
6.	Ran engine for a short time after changing oil to check for leaks	☐	☐	☐	☐
7.	Disposed of old oil, supplies,and tools properly after the task was completed	☐	☐	☐	☐

Learning Activity Package No. 82



Maintaining Equipment

LUBRICATING A TRACTOR

Objective No. 124

Ornamental Horticulture

INTRODUCTION

In gardening and groundskeeping employment, the ability to skillfully operate a tractor is one of the most important abilities an employee can have. Included in the job of tractor operation is daily maintenance. Maintenance, such as lubricating the vehicle, is one very essential task. The regular greasing of a tractor is required; it saves wear and makes it easier to operate the tractor. In this learning activity package you will learn how to correctly lubricate a tractor.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity,

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a tractor, tools, necessary lubrication materials, and the manufacturer's lubrication recommendations, lubricate each grease fitting. A visual inspection of all lubrication points must indicate that each one has been serviced.

LEARNING ACTIVITIES

1 READ *Tractor Operation and Daily Care*, American Association for Vocational Instructional Materials, 120 Engineering Center, Athens, Georgia 30602, pp. 11-14.

or ________________________________

2 STUDY in *Owner's Manual* lubrication chart for the model tractor you will service.

3 READ the Instructions, LUBRICATING A TRACTOR.

4 CHECK YOUR KNOWLEDGE of lubricating a tractor by taking the Student Self-Check.

5 ARRANGE with your instructor to complete this package by going through the Check-Out Activities.

EQUIPMENT NEEDED

Pressure grease gun

MATERIALS NEEDED

Grease, multi-purpose or chassis
Clean rag for wiping fittings

INSTRUCTIONS

LUBRICATING A TRACTOR

(1) Locate lubrication points on machine, using manufacturer's manual as a guide.

(2) Determine type of lubrication fitting or opening.

(3) Determine proper lubrication for each fitting or opening. Check to see if the water pump is of a type that requires greasing; regular chassis grease is not satisfactory but the multi-purpose grease can be used for the water pump. A separate grease gun filled with special water-pump grease may be kept just for this purpose.

(4) Wipe end of each grease fitting with a clean rag before greasing it.

(5) Place grease gun nozzle on fitting and hold in a straight line with it.

(6) Grease each fitting carefully. Do not overfill any fitting which has a rubber dust cover.

(7) Remove the gun from the fitting by swinging it through a 30 degree arc.

(7) Wipe any excess grease from the fitting.

(9) Put away any tools, equipment, and supplies.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

LUBRICATING A TRACTOR

Answer the following:

1. On many tractors there are some places which normally require greasing after each
   - (a) 10 hours of operation
   - (b) 30 days use
   - (c) 6 months use
   - (d) 1 year's use

2. Maintenance of the tractor, such as regular greasing is normally considered a responsibility of
   - (a) a mechanic
   - (b) the tractor operator
   - (c) the dealer
   - (d) the service station

3. Which of the following is not suitable for greasing the water pump of a tractor?
   - (a) water-pump grease
   - (b) multi-purpose grease
   - (c) chassis grease
   - (d) all of the above

4. Before pumping grease into grease fittings they should be wiped with a clean cloth in order to
   - (a) prevent dirt from being forced into the bearing
   - (b) keep dirt out of the grease gun
   - (c) keep tractor looking better
   - (d) remove any excess grease

5. To determine the frequency for lubricating various points of wear on a tractor, the best source of information to refer to is
   - (a) a tractor mechanic
   - (b) the tractor owner's manual
   - (c) other tractor owners
   - (d) the local service station

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, LUBRICATING A TRACTOR.

Lubricate the tractor designated by your instructor.

CORRECT RESPONSES

1. (a) 2. (b) 3. (c) 4. (a) 5. (b)

DO NOT WRITE ON THIS SHEET

LAP 82

Student ____________________

Date ____________________

LUBRICATING A TRACTOR

Instructor's Final Checklist

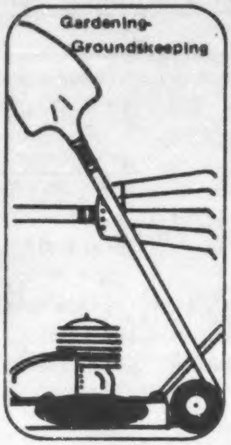
Check the student's performance in the following elements of lubricating a tractor.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Located and greased all points requiring lubrication, according to the manufacturer's manual.	☐	☐	☐	☐
2. Used the proper type lubricant.	☐	☐	☐	☐
3. Wiped fittings clean before and after filling.	☐	☐	☐	☐
4. Avoided overfilling any fittings.	☐	☐	☐	☐
5. Stored supplies and equipment properly after use.	☐	☐	☐	☐

Learning Activity Package No. 83



Maintaining
Equipment

REPLACING SPARK PLUGS IN TRACTORS

Objective No. 138

Ornamental Horticulture

INTRODUCTION

The gardening and groundskeeping tractor operator should take pride in keeping the equipment in first-class operating condition. There is much more pleasure in operating well running and handling machinery. In tractor operation, one of the maintenance procedures which helps insure an efficiently operating tractor is keeping the spark plugs in good condition. Studies have shown that efficient spark plugs can both increase the engine horsepower and lower the amount of fuel consumed. In this learning activity package you will learn to replace spark plugs in tractors.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided with a tractor, manufacturer's manual and access to necessary tools, equipment and supplies, change the spark plugs in the tractor. Spark plug gap should be exactly that recommended by the tractor manufacturer. The engine must idle smoothly. All seat washers must be properly seated on the spark plugs. Spark plug insulators must not be broken, and threads must not be damaged due to overtorque.

LEARNING ACTIVITIES

1 READ *Tractor Maintenance Principles and Procedures,* American Association for Vocational Instructional Materials, 120 Engineering Center, Athens, Georgia 30602, pp. 54-63.

or ______________________________

2 CHECK your tractor's *Operator's Manual* for the size and type of spark plug recommended for your particular tractor model.

READ the Instructions, REPLACING SPARK PLUGS IN TRACTORS.

4 **CHECK YOUR KNOWLEDGE** of replacing spark plugs in tractors by taking the Student Self-Check.

5 **ARRANGE** with your instructor to complete this module by going through the Check-Out Activity.

SAFETY

Not applicable

EQUIPMENT NEEDED

1. Spark plug wrench
2. Wire feeler gauge
3. Compressed air source, or small paint brush (for cleaning around plugs)
4. Torque wrench (if available)

MATERIALS NEEDED

New spark plugs of recommended size and type

INSTRUCTIONS

REPLACING SPARK PLUGS IN TRACTORS

1. Disconnect spark plug wires by pulling them straight away from the plugs. Place the ends of the wires in order so they can be connected to the same cylinders when they are re-connected.

2. Clean the dirt from around each plug with compressed air or by brushing with a small paint brush.

3. Loosen the spark plugs. Use a spark plug wrench of the proper size.

4. Remove the spark plugs, keeping them in order as removed. You can then identify them with the cylinder from which removed to help detect a cylinder which is using oil or otherwise not operating properly.

5. Check to see that all gaskets were removed with the plugs.

6. Check the gap on each new spark plug and if necessary re-set the gap, using manufacturer's specifications.

7. Replace the plugs and tighten with the fingers. Be sure there is a gasket on each plug.

8. Tighten each spark plug using a torque-wrench. Refer to the operator's manual for the torque to be applied. If a torque wrench is not available, refer to Table III in *Tractor Maintenance Principles and Procedures* for the amount to tighten different size plugs.

9. Connect the spark plug wires. Check the connections and insulation on all wires. Replace any that are damaged, including any with cracked insulation.

10. Check to see that the tractor cranks readily and runs smoothly.

STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

REPLACING SPARK PLUGS IN TRACTORS

Answer the following:

1. Do spark plugs effect engine performance in horsepower and/or fuel consumption?

   (a) in horsepower only
   (b) in fuel consumption only
   (c) horsepower and fuel consumption
   (d) in neither

2. The terms "hot," "normal," and "cold" in reference to spark plug types relates to

   (a) the intensity of the spark
   (b) the season of the year for using the plug
   (c) the operating temperature of the plug
   (d) the operating temperature of the engine

3. The threaded lower portion or "reach" of spark plugs are of different lengths in order that they will

   (a) fit different depths of engine heads
   (b) give different heat ranges
   (c) burn different types of fuel
   (d) change as the engine gets older

4. An open-end or box-end wrench should not be used to remove or install spark plugs because

   (a) they will not fit the plug
   (b) they may slip and injure your hand
   (c) there is danger of cracking the porcelain
   (d) you may overtighten the plug when replacing it

5. When a spark plug is tightened, the proper amount the gasket will be

   (a) crushed to less than 1/2 of its original thickness
   (b) crushed to about 2/3 of its original thickness
   (c) not crushed at all

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity.

CORRECT RESPONSES

1. (c) 2. (c) 3. (a) 4. (c) 5. (b)

CHECK-OUT ACTIVITY

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, REPLACING SPARK PLUGS IN TRACTORS.

Change the spark plugs in the tractor designated by your instructor.

DO NOT WRITE ON THIS SHEET

LAP 83

Student ______________________________

Date ______________________________

REPLACING SPARK PLUGS IN TRACTORS

Instructor's Final Checklist

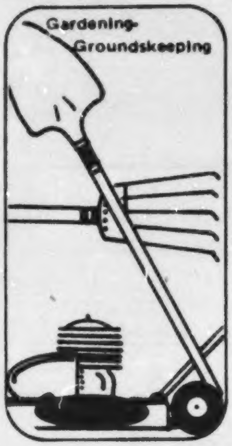
Check the student's performance in the following elements of replacing spark plugs in tractors.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Used the tractor Operator's Manual to verify the spark plug size and type.	☐	☐	☐	☐
2. Checked the gap on each new plug.	☐	☐	☐	☐
3. Cleaned debris from around plugs before they were removed.	☐	☐	☐	☐
4. Used recommended tools in installation.	☐	☐	☐	☐
5. Stored tools after completing the task.	☐	☐	☐	☐

Learning Activity Package No. 84



Maintaining Equipment

REPLACING BREAKER POINTS ON A TRACTOR

Objective No. 139

Ornamental Horticulture

INTRODUCTION

It is generally recognized that proper engine performance in a gasoline tractor is dependent upon a well-functioning electrical system. In addition to needing well-maintained spark plugs to ignite the fuel, tractor power and fuel economy are dependent on a properly functioning distributor. A gardening and groundskeeping tractor operator should be able to service a tractor distributor when necessary. In this learning activity package you will learn how to check the condition of a tractor distributor and to replace the distributor breaker points.

DIRECTIONS

Read the objective below. If you think you are ready to perform this task, read the Check-Out Activity. Then, arrange with your instructor to complete the Check-Out Activity.

or

If you need further training in order to do the task, go through the Learning Activities in the order given.

OBJECTIVE

Provided a tractor, manufacturer's manual and access to tools, equipment, and supplies, replace the breaker points on the engine. The breaker point gap should be set exactly as recommended by the engine manufacturer. The engine should start without excessive drainage of battery power.

LEARNING ACTIVITIES

1 READ *Tractor Maintenance Principles and Procedures,* American Association for Vocational Instructional Materials, 120 Engineering Center, Athens, Georgia 30602, pp. 93-99.

or ______________________________

2 REVIEW your tractor *Operator's Manual* for information on make and type of distributor and recommendations on replacing breaker points.

3 READ the Instructions, REPLACING BREAKER POINTS ON A TRACTOR.

4 CHECK YOUR KNOWLEDGE of replacing breaker points on a tractor by taking the Student Self-Check.

5 ARRANGE with your instructor to complete this module by going through the Check-Out Activity.

SAFETY

Not applicable.

EQUIPMENT NEEDED

1. Screwdriver
2. End wrenches
3. Thickness gauge

MATERIALS NEEDED

1. New breaker points for type of distributor to be serviced
2. Clean rags
3. Small pan of kerosene or diesel fuel for cleaning

INSTRUCTIONS

REPLACING BREAKER POINTS ON A TRACTOR

1. Wipe dirt from distributor and cap. If greasy, use small amount of diesel fuel or kerosene to clean.
2. Remove distributor cap and wipe clean. Do not remove the wires.
3. Remove the distributor arm (rotor) by pulling it straight up from the end of the shaft.
4. Remove breaker arm and spring. Note placement of parts carefully so new parts can be replaced in the same manner.
5. Remove stationary breaker point and bracket. Note its positioning also.
6. Clean and lubricate cam. Use only a thin film of petroleum jelly or multi-purpose grease.
7. Apply a drop of SAE-10 motor oil to the contact point pivot post.
8. Install new points in reverse order.
9. Adjust the breaker point gap:
    a. Turn the engine until cam opens points to widest position; engine can be turned by touching starter lightly until a cam lobe opens the points, or put the transmission in high gear and rock the tractor to turn the distributor cam.
    b. Use a feeler gauge and check the points for proper spacing. The correct spacing for your tractor can be found in your Tractor Operator's Manual.
    c. To adjust the gap, loosen lock screw on the bracket of the stationary breaker point. Using a screwdriver to move the bracket, adjust the opening to the gap specified by the manufacturer's manual.
    d. Be sure that the breaker-point faces fit together squarely. It may be necessary to bend the points into position to get them to sit squarely.
    e. Lock the stationary breaker point into position with the lock screw.
    f. Recheck the gap between points to be certain that no change was made in the gap setting while tightening the lock screw.
    g. Run a strip of paper between the points. This will remove any oil or dirt from the contact faces.
10. Oil the wick in center of the camshaft with two drops of SAE-10 motor oil.
11. Wipe the distributor arm (rotor) clean and replace it.
12. Replace the distributor cap.
13. Arrange to start the engine to see that it cranks readily.
14. Inquire to see if you are to check ignition timing. Installing new points may change the engine timing from what it was with the old points.

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STUDENT SELF-CHECK

DO NOT WRITE ON THIS SHEET.

REPLACING BREAKER POINTS ON A TRACTOR

Answer the following:

1. The primary function of the tractor distributor is
   - (a) to develop a hot spark for igniting fuel
   - (b) to time the spark so it occurs at the right instant and is transmitted to the correct cylinder
   - (c) to generate the electrical current needed to the tractor's electrical system
   - (d) to distribute the fuel to the proper cylinder in measured amounts

2. If distributor points are badly burned, pitted,or worn you should
   - (a) repair by filing with an ignition file
   - (b) replace with new points
   - (c) replace the entire distributor
   - (d) clean and re-gap them

3. In adjusting breaker points, the gap is determined with a feeler gauge when
   - (a) the idling speed is set to a fast idle
   - (b) the speed-control lever is in the closed position
   - (c) the distributor cam opens breaker points to their widest position
   - (d) the distributor cam closes the breaker points to a fully closed position

4. If breaker points are set too wide it tends to cause
   - (a) the points to last longer
   - (b) an increase power and fuel economy
   - (c) the points to burn
   - (d) a weak spark at higher engine speeds

Compare your answers with the correct responses at the bottom of this page. Review any incorrect answers before going on to the next learning activity package.

CHECK-OUT ACTIVITIES

The statement below explains the activity you must be able to complete in order to finish this learning activity package. As you go through this activity, your instructor will rate your performance using the Instructor's Final Checklist, REPLACING BREAKER POINTS ON A TRACTOR.

Replace the breaker points of the tractor designated by your instructor.

CORRECT RESPONSES

1. (b) 2. (b) 3. (c) 4. (d)

DO NOT WRITE ON THIS SHEET

LAP 84

Student ____________________

Date ____________________

REPLACING BREAKER POINTS ON A TRACTOR

Instructor's Final Checklist

Check the student's performance in the following elements of replacing breaker points on a tractor.

Place an X in the appropriate box indicating not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, the item was impossible to complete, place an X in the "Not Applicable" box.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will discuss this and decide which learning activities must be repeated.

	Student Performance			
	Not Applicable	Not Accomplished	Partially Accomplished	Fully Accomplished
1. Cleaned the distributor and cap.	[ ]	[ ]	[ ]	[ ]
2. Cleaned and lubricated the cam with a thin coating of grease.	[ ]	[ ]	[ ]	[ ]
3. Oiled the pivot post and the wick in the center of the camshaft very lightly with light weight motor oil.	[ ]	[ ]	[ ]	[ ]
4. Set the breaker point gap exactly as recommended by the engine manufacturer.	[ ]	[ ]	[ ]	[ ]
5. Stored tools and any remaining materials or supplies properly after completing the task.	[ ]	[ ]	[ ]	[ ]

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